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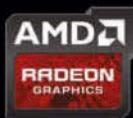


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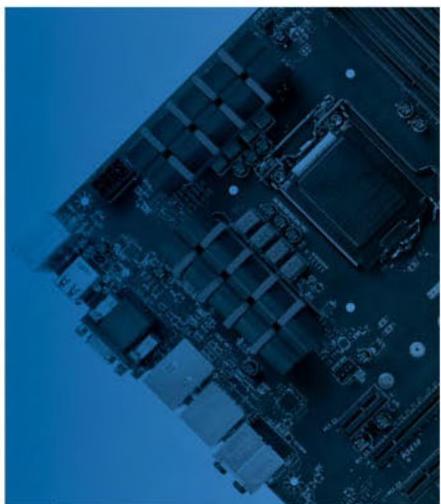
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The PCPP Hardware & Tech Buyer's Guide

A roundup of 2015's best and smartest components



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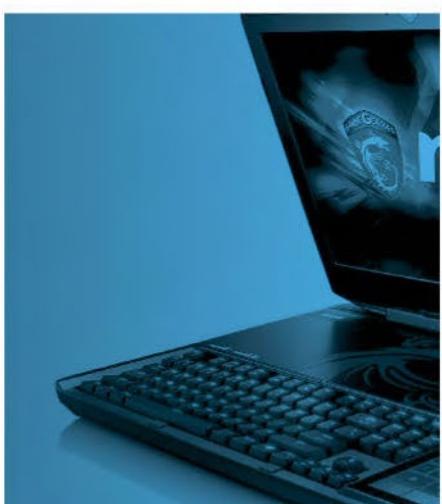
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One step ahead

It is my pleasure and honour to once again introduce you to PC PowerPlay's annual tech-fest, with pages stuffed to the brim with the latest in PC hardware. As the Tech Editor at PC PowerPlay and its sister magazine PC and Tech Authority, I get to see every major PC product release, and this special covers my hand-picked selection of the best of the best.

PC gaming is a vastly different beast to the consoles, with cheaper game prices, a wider variety of genres and titles, and even our humble mouse/keyboard controls separating us from the tightly controlled ecosystems of the consoles. But it's the PC's ever evolving hardware that is the biggie, the thing that makes PC gaming the home of cutting edge technology, and the place to be for the most innovative gaming experiences. Thanks to the ongoing battles between Intel and AMD, and AMD and NVIDIA, we're treated to potential performance increases of 40% or more each year, provided you don't mind spending the moolah that it costs. Over the course of the PS4's expected ten year lifespan, which launched with specs putting it neck and neck with a mid- to low-range PC, we can expect the overall processing power of the PC to quadruple, leaving Sony's little black box looking like an antiquated pocket calculator.

It's not just performance enhancements that make the PC such a revolutionary gaming platform. Its wide range of open standards mean we get to try new genres and hardware experiences long before the others. While the Playstation *might* get Virtual Reality sometime in 2016, by this time next year a large portion of the hardcore PC gaming community will be actively enjoying VR gaming on a weekly basis (trust me, the day before writing this I got to use the newest Oculus Rift prototype with EVE Valkyrie, and the jump in resolution was simply phenomenal - it's going to be a must-have device for PC gamers). We were the first platform to get SSDs, which lowered game loading times from minutes to mere seconds. The PC's inherent connectedness means we're still the preferred platform for MMOs, and there are hundreds of online experiences that can still only be found on the PC. DirectX 12 is going to deliver incredible new graphics experiences, finally able to utilise the parallel processing offered by multiple GPUs and CPU cores to their full potential.

We do pay a price for this power though; the PC is definitely a costlier, fiddlier system to maintain, yet that's also part of the appeal for us PC gamers. Like car enthusiasts, we love the smell of a new piece of hardware, and there are few things more satisfying than plonking the latest in technology into your system and immediately seeing the benefits.

So the next time your PC blue screens, or you wince at having to blow \$600 on a new GPU, remember the alternative - endless rehashes of Call of Duty or HALO, with graphics that rarely improve and a control pad as your only way to play.

Hopefully the following pages will help you keep your PC one step ahead of the rest, whether you're building a quad-GPU overclocked monster, or upgrading your miniature HTPC to play casual games.

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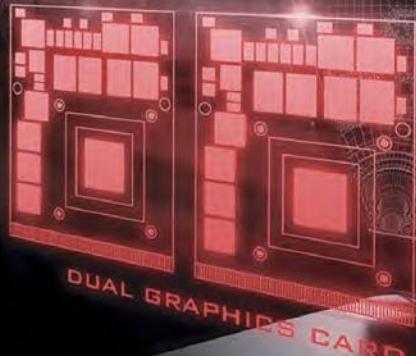
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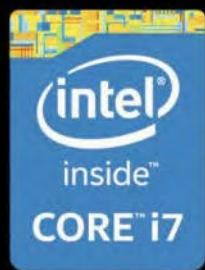
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01

The most drool-worthy products on the show floor

01 MSI AX24

Available: 2015 • RRP: TBA

It's hard to sell people on the gaming viability of All in One systems, but with the AX24, MSI has a good chance of doing just that thanks to the upgradability of the platform and the fact that it makes a feature of the fact it can hold a full sized videocard. The 24" display is a little lacking in frills – it's only 1920x1280 in the current model – but a large shoebox style enclosure for the back mounted GPU shouts out the unit's potential power. MSI also says they are considering building a version of the AX24 with dual videocard support. If that doesn't sell gamers on the possibilities of AIO systems, nothing will.

02 ASUS RoG G20

Available: Now • RRP: \$2177

Looking for a super compact gaming PC? The RoG G20 should fit the bill. Crammed inside the 12.5 litre case is a core i7-4790 CPU, a GeForce GTX980 (4GB), 16GB RAM, a 1TB HDD and 128GB SSD (or equivalent AMD/Radeon hardware if you should so desire. What's most amazing about this super compact PC is that despite the power crammed it the tiny chassis, it's extremely quiet, clocking in at just 22db. If 12.5 litres is too big for you, ASUS is soon launching an even more compact RoG case to system builders. We can't wait to see what people can cram into that one.



02



03

03 Quanta Compute Plug

Available: TBA • RRP: TBA

PCs are getting smaller and smaller and are being stuck into more and more diverse devices. There are computers in fridges, microwaves, watches, tables, so why not a power plug? The Quanta Compute Plug is a mini Windows 10 PC that can be plugged directly into a wall socket and then connected to any TV to make it Smart. The Compute Plug can be controlled via Bluetooth using Cortana. Inside the tiny PC is a Intel Bay Trail T-CR SoC(Z3735F)7 chip, 2GB RAM and 64GB flash memory. It's not the most powerful mini-PC around, but it should be perfect for streaming Netflix or watching the Youtubes on the big screen.

04 Synology RT1900AC router

Available: TBA • RRP: TBA

From a technical standpoint, the RT1900AC router checks all the right boxes, offering IEEE 802.11b/g/n/ac, 2.4GHz and 5GHz dual simultaneous bands and 3x3 MIMO streams. There are also the requisite antennae, a USB 3.0 port and even an SD card slot. Where the router truly shines, however, is the beautifully usable, simple and friendly interface based on their wonderful NAS operating systems. This new interface, SRM (Synology Router Management) OS 1.0 has a simple GUI but a huge deal of granularity for controlling data traffic, website and parental control. You can even control when the flashing lights are on so you don't have to put up with them when you're trying to sleep.



04



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05

05 Galaxy Vision

Available: 2016 • RRP: \$200 USD (approx.)

It seems that everyone is jumping on the VR bandwagon. Sony, Valve, Samsung and others announced their own headsets after the astounding success and viral popularity of the Oculus Rift. No Galax, the company formerly known as

Galaxy have launched their own VR headset with the Vision. Unlike the majority of VR headsets, the Vision is not being launched as a premium product, but rather a budget approach to the realm of screens in front of your eyes. The specs are modest – 1080p, 60hz, 25ms response time – but so is the price tag. It will be interesting to see if there's any market for low end VR.



06

06 Thermaltake eSports Isurus Pro headset

Available: 2015 • RRP: \$39.99 USD

Thermaltake has been making gaming headsets for years, but with the Isurus Pro they really chart some new territory. The Isurus Pro is the world's first in ear gaming headset with a detachable microphone. It's a pretty damn impressive little thing, both in terms of design and sound quality. The in-ear buds are powered by a 13.5 neodymium driver and from our brief time with them they showed excellent treble and surprisingly robust bass response. The flat cables are tangle free and contain in line controls, including a secondary mic that can be used when paired with a phone. As long as you don't hate having things stuck in your ears these could be a cheap but effective gaming solution.



07 Thunder Tiger Seawolf

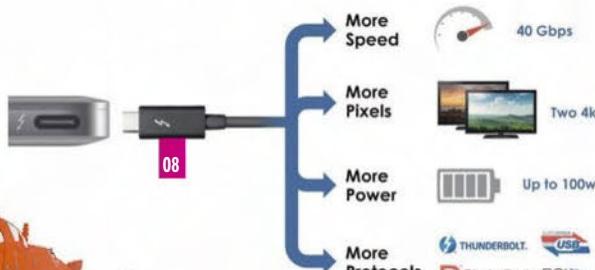
Available: 2015 • RRP: Approx. \$1000 USD

Before talking about the Seawolf, can we first acknowledge that Thunder Tiger Robotix is possibly the best company name ever? If you worked for them you'd carry business cards everywhere so you could prove that you worked for such an awesome sounding company. The Seawolf is pretty awesome too – a drone submarine for your GoPro camera capable of diving up to 10m into the briny deep to look for treasure or spy on the lower halves of people treading water. There are two skews currently on offer – one that sends the GoPro image to a phone and another that includes an 8" LCD monitor for a better view of the monsters that lurk below the waves/bikini bottoms.

08 Thunderbolt 3 on USB type C

Available: 2015 • RRP: Varies

Rather than trying to push their proprietary connector with Thunderbolt 3, the company has instead decided to join forces with their opposition to bring Thunderbolt 3 technology to the reversible USB Type-C connector. What this means in practical terms is some pretty damn future proof data transfer tech. Thunderbolt 3 is capable of 40Gbps throughput. By comparison, the newly released USB 3.1 is only capable of 10Gbps throughput. The other great advantage of Thunderbolt 3 is that it's a multipoint 4e cable, capable of transferring enough data to run two 4k screens, charge or power devices up to 100W, run display port and more. The first Thunderbolt 3 motherboards should be hitting shelves within the next few months, with the major push happening in 2016.





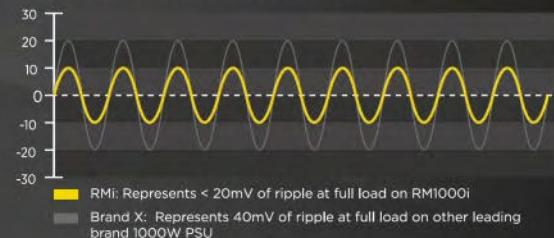
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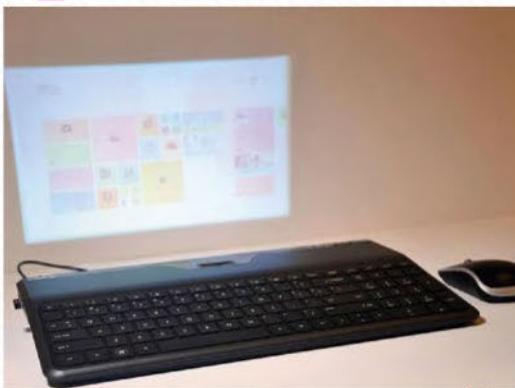


09

09 Cougar 450k

Available: 2015 ■ RRP: \$60 USD

When it comes to gaming there are essentially three tiers of keyboard. You have your membrane keyboards at the bottom of the heap and mechanical switches at the top. Somewhere in the middle are the hybrid keyboards that combine membrane technology with keys that feel somewhat like mechanical switches. It's not the hybrid switches that make this keyboard interesting, however. It's the fact that it's waterproof. Anyone who has ever spilled a drink into their prize keyboard during a gaming session or has eaten over their desk knows the pain of ruined switches. Has Cougar found the solution with the 450k?



10

10 Sho U KiBoJet pico projector keyboard

Available: TGA ■ RRP: TBA

This nifty little keyboard does away with the need for a monitor by wedging a tiny pico projector into the frame. The projector is capable of throwing a 22" screen at a distance of up to 33". It's unlikely that the projector will have a high enough resolution or refresh rate to make it any good for gaming in a small room, but it could be a lifesaver when it comes to workflow when you're strapped for space. The prototype keyboard currently features Bluetooth and Wi-Fi support as well as a built in 3W speakers, but these specs may change by the time the product hits the market.



11

11 ASUS E1Z LED Projector

Available: TBA ■ RRP: Approx. \$200 USD

The full specs of resolution and brightness haven't been released for the E1Z LED projector as yet, but even without those crucial details there is a lot to like about this tiny little projector. It houses a massive 6000mAh battery and does away with the need for HDMI. The only connectors on the projector are a micro-USB input6 and a standard USB output that can be used either for data transfer or to charge other USB devices from the huge battery. The micro-USB input makes it perfect for connection to a phone, tablet or laptop and the small form factor makes the E1Z extremely portable.



12

12 In Win H-Tower concept chassis

Available: TBA ■ RRP: All the money

In Win have a history of making some rather extravagant cases available only through limited product runs. In the past they have had the S-Frame and the H-Frame, but the 2015 concept case, the H-Tower leaves them all in the dust in terms of both ambition and extravagance. Closed, the tower looks for the most part like a computer tower, but it's the way the case opens that makes it special. The four corners fold out like the opening of a metal flower while the internals get tilted up for easy access. Of course, this is all mechanised, because who has the time to actually open their PC.

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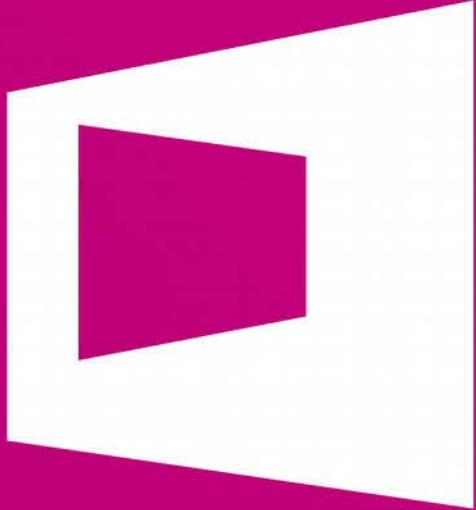
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CORSAIR



CORSAIR BULLDOG

In a year where exciting product announcements were harder to find than a sweat-free journalist in Taipei's sauna-like humidity, Corsair's big reveal stood head and shoulders above the pack. The Bulldog DIY 4K Gaming PC is a Small Form Factor, barebones machine designed to squat inside your home theatre AV rack, and comes packing a bunch of features that make this the top dog in town. We're not too sure about the claims of it being 4K-ready, but it's definitely the most impressive basis for a small gaming PC we've seen.

While we don't have the exact dimensions on hand, it's slightly larger than the slim-line HTPC cases usually associated with the living room, but should slide nicely into any standard AV unit. The look of the case is bound to be divisive, with its squat angular lines evoking the chubby form of a British Bulldog. Note that its cute little legs aren't optional, as it needs to be raised

to allow airflow below the case. The prototype we viewed was constructed from aluminium and plastic, but the final version will replace the former with steel.

It's what's inside the case that makes the Bulldog so special; this is one pedigree mutt throughout. For the suggested price tag of US\$399, it includes a bunch of goodies. A mini-ITX motherboard will form the backbone of your gaming PC, but Corsair hasn't decided which manufacturer to go with yet, only confirming that it'll run any Intel i7 or lower CPU. Keeping such a speedy chip cool in the confined space falls to the Hydro Series H5SF All-in-One liquid CPU cooler, which should also help keep annoying fan noise to a minimum. There's also an optional HG10 GPU cooler not included in the price and, when combined with the CPU cooler, the entire package aims to deliver no more than 30dB of annoying fan noise.

This optional GPU cooler can be mounted on full-sized GeForce GTX 970/980/Ti and Titan X products, as there's room inside the case for one of these greyhound GPUs. One caveat is

that the graphics card must be based on a reference design for the GPU adaptor to work, which then allows a Corsair H55 CPU cooler to whip away the heat. There's no denying the speed of these products, but even the Titan X isn't quite ready to churn out 60 frames of 4K resolution at Ultra detail; Corsair is instead aiming for a framerate of 45fps or so, but we think 1080p will be good enough for most gamers. Powering all of these components is a tiny 600W power supply, which manages to deliver excellent 80+ Gold efficiency.

We'd expect such a jam-packed little critter to easily sell for \$700 or more, which makes the anticipated price point so damn exciting. Given Corsair's excellent reputation when it comes to cases and cooling, we don't doubt that the Bulldog will be have one of the quietest barks on the block, but it's also got the capacity for one hell of a bite, provided you don't mind spending the necessary bucks to deck it out with top-shelf components. You can expect to find the Bulldog tearing through the competition in late 2015.

We'd like to thank **CORSAIR** and **GIGABYTE** for sponsoring our trip to Computex 2015



CORSAIR LAPDOG

With the Bulldog aiming to be the alpha dog in the living room, gamers will need some way to play games from the comfort of your couch. A wireless Xbox controller will surely be a handy way to tame this little fella, but it lacks the accuracy serious FPS players need to dominate the Battlefield. Enter the Lapdog, a keyboard and mousepad combination designed to bring your desk skills to the couch.

Looking like a stable table designed for gamers, this large slab of input goodness incorporates space for a keyboard alongside a mousepad. Foam padding underneath helps to keep it nice and stable, while a large chamber along the top edge will hide away all of those pesky USB cables. The price will start at US\$89 for the unit without a keyboard, increasing to US\$199 with a K65 keyboard.

We tried it out in Corsair's private demo suite, and found it to be one of the better lap-mounted gaming peripherals around, with a couple of caveats. Firstly, the cable-hiding chamber is far too large, and it encroaches on the vertical

height of the mouse pad. Secondly, there's no wrist-rest, which feels a little strange if you're used to one. Thankfully Corsair is still tweaking the design, so hopefully these quirks will be ironed out by the time it's released in Q4 of this year.

CORSAIR STRAFE

Corsair's K70 RGB continues to fly off Aussie shelves faster than complimentary beers at a Computex media party, but it's a little pricey for those on the tightest of budgets. Enter Corsair's new Strafe keyboard, a Cherry MX powered entry-level beast that feels just right. It foregoes the aluminium construction and RGB lighting of the K70, instead using chunky plastic and plain backlighting to deliver a potent home for Red or Brown switches, but priced at just US\$89. Despite the low pricing, it's still fully programmable and includes media shortcuts for easy listening. The Strafe should be on Aussie shelves by

the time you're reading this, and we'll have a full review in the very near future.



CORSAIR HG10 GPU WATER COOLING BRACKET

Want to easily add water cooling to your shiny new GeForce GTX 970/980/Ti or Titan X? This super-affordable (US\$39) bracket does just that, replacing the stock air-cooler on the aforementioned products. It's the same bracket that is being sold as an optional extra with the Bulldog, and installation is a cinch; just whip off the old air cooler after removing a few screws, then screw the HG10 into place. It doesn't come with a water cooler though, as you'll need to then purchase one of Corsair's Hydro series of coolers to remove the heat, and it'll also only work with reference design cards. Corsair expects MSI to ship products with this bracket/cooler combo attached, which will bump up the price by just US\$80 over its air-cooled offerings.

1. The Bulldog's legs allow for optimal airflow

2. The Lapdog has enough space to fit a full sized mechanical keyboard

3. HG10 Water Cooling Bracket

4. The Strafe Keyboard forgoes aluminium for plastic to keep the price down

GIGABYTE



Hosted high above Taipei in the world famous Taipei 101 skyscraper, Gigabyte's VIP suite provided a welcome respite from the blaring booth babes and screaming speaker systems of the show floor. As expected, the first room was crammed wall to wall with brand new motherboards, and it was the new Skylake creations that caught our attention.

GA-Z170X-GAMING G1

Emblazoned in stunning white heat shrouds, Gigabyte's gorgeous new GA-Z170X-Gaming G1 motherboard evokes the look of the Mechas that feature so prominently in modern Manga. At any moment we expected our PR host to press a button on the board that would transform it into a futuristic jet-fighter, but sadly that wasn't to be. Thankfully there were plenty of other goodies that made Gigabyte's new flagship gaming board worthy of our attention, not to mention the expected \$450+ price tag.

Powering this premium product is Intel's shiny new Z170 chipset, which replaces the Z97 chipset and is designed to go hand in hand with Intel's new 14nm Skylake processors. This comes with several key new features, chief amongst these being support for DDR4 memory. Hopefully this will prove to be more popular than the X99 chipset's use of DDR4 memory, which sold dismally. The Z170 chipset comes with a new CPU socket as well, in the form of the LGA 1151 socket, which adds an additional pin compared to the LGA 1150 socket used today on Intel's mainstream boards. We're a little confused about this socket though; while everything we've read online suggests it's not backwards compatible with today's LGA 1150 CPUs, we're positive that several PR peeps told us at Computex that it will be. We've reached out to Intel for clarification.

The number of PCIe lanes has also been given a shot in the arm, with 20 PCIe 3.0 lanes up for grabs. This should



prove to be a huge benefit for those using multiple M.2 SSDs, and Gigabyte's new gaming board now includes two M.2 slots for these speedy drives, along with three SATA Express connectors. Intel's new NVMe protocol is supported, which gives the Intel 750 SSD a massive speed increase over traditional SSDs. The increase in PCIe lanes also allows this board to drive up to four NVIDIA graphics cards, without compromising on PCIe performance. Each of the full length PCIe slots are now encased in metal, providing better EMF shielding as well as stronger support for the weight of so many graphics cards. Intel's Alpine Ridge controller is included, which delivers both Thunderbolt 3.0 and USB 3.1

connectivity, while the included HDMI output is of the speedy 2.0 variety.

We've been big fans of Gigabyte's onboard sound solutions for quite some time, and its new Gaming G1 ups the audio ante once again. It still uses Creative Soundblaster audio, in the form of the ZxRi chipset, but this time it's rated to deliver a 120dB signal to noise ratio, which Gigabyte claims makes it the cleanest onboard audio solution ever delivered. As usual, the removable amplifier chip is still included, and it's still called Op-Amp. Finally, the Killer's brand new DoubleShot Pro X3 chipset handles all networking duties. As you can see, this is a killer board for gamers, and we can't wait to test it come early August.





GIGABYTE GA-H170-GAMING 3

Thankfully Gigabyte also has a huge range of new motherboards that will support the new Skylake processors at a variety of prices, so gamers won't need to spend the mega bucks to upgrade to one of these new CPUs. Of chief interest to us was the new GA-H170-Gaming 3 motherboard, which is based on the more affordable H170 chipset. Once again we see DDR4 support being rolled out, which is sure to have memory makers rubbing their hands with glee, but the rest of the specs have been trimmed to deliver a slightly less insanely indulgent product. Socket 1151 is par for the course, but it doesn't officially enable multiplier overclocking; it'll be interesting to see if Gigabyte can get around this like so many H-series boards in the past. The total number of PCIe lanes is still impressive, delivering 16 x PCIe 3.0 lanes in total, but this board only supports AMD's CrossFire dual GPU setup. Apparently ratification for NVIDIA's SLI technology requires a relatively hefty licensing fee, so Gigabyte has left it out.

There's only one M.2 port this time around, while the onboard audio has dipped to a mere 115dB SNR, which is still freakishly impressive. All of these cuts have resulted in a board that should retail for around AU\$150, making it a steal for those looking at a budget Skylake system.

GIGABYTE P37X V4

We recently reviewed Gigabyte's kickarse P37X system in PC PowerPlay, and were privy to the latest version of this gaming laptop at the show. The v4 system now upgrades the GPU to an NVIDIA GTX 980M chip paired with a whopping 8GB of GDDR5 memory, making it the fastest mobile graphics chipset on the market. Storage has also been upgraded, now featuring twin 512GB mSATA SSDs, along with a two 2TB mechanical drives. Gigabyte claims this is the thinnest and lightest 17.3 inch laptop to feature the GTX 980M chipset on the market, making it surprisingly portable for such a powerful performer. Unfortunately pricing for this upgraded beast wasn't available at the show, but stay tuned for an indepth review in the

near future, where we'll see what the GTX 980M is capable of.

GIGABYTE P55W V4

If the P37X v4 seems like overkill, the P55W could just what your wallet ordered. This 15.6" laptop seems to share a similar design ethos to Gigabyte's sister company, Aorus, with angular indentations on the chassis suggesting that it's good for running more than mere MS Office. The major improvement over earlier versions is the upgrade to Intel's new 5th Gen Core i7-5700HQ processor, which has a maximum Boost frequency of 3.5GHz. Interestingly this is slightly slower than its predecessor, which had a top speed of 3.6GHz, but used the slightly slower 4th Gen Core architecture. The new CPU has been paired with NVIDIA's GeForce GTX 970M GPU, which includes a healthy dose of 3GB of GDDR5 memory. Throw in a 512GB SSD and 2TB mechanical drive, and the result is a gaming laptop on par with many mainstream gaming desktops. Again, pricing wasn't available at the time, but expect it to cost a fair whack less than the P37X v4.

2 Gigabyte claims this is the thinnest and lightest 17.3 inch laptop to feature the GTX 980M **3**

1 The GA-Z170X-Gaming G1 looks to have more than enough goodies to justify the price

2 The P37X V4 is light for a 17.3" gaming laptop but still boasts a GTX 980M

3 The P55W V4 is a more budget friendly gaming solution

4 The Gigabyte sponsored case modders really put on a show



1



1. The Aorus X5 is hugely powerful but surprisingly affordable

2. Some cosplayers with the X5, because that's how Taiwan do.

AORUS



It turns out we've been pronouncing this company's name wrong since its inception, but luckily you'll never know this (turns out it's "Aww-russ"). The sister company to Gigabyte is renowned for delivering some of the finest gaming laptops that money can buy, and it took this year's Computex as an opportunity to introduce us to the key new product in its range, the X5.

AORUS X5

Welcome to the winner of the Computex Best Choice Award, Aorus' stunning new slimline gaming laptop, the X5. Aorus claims this is the world's most powerful lightweight gaming laptop, and it uses not one but twin GeForce GTX 965M GPUs running in SLI mode to accomplish this. The use of twin low-powered GPUs has allowed this 15.6 inch laptop be just 0.9 inches thick at its deepest point. It's a rather

heavy little critter considering its depth though, tipping the scales at 2.4kg.

Continuing the innovation, the X5 comes with a G-Sync compatible display, though it's by no means the only laptop we saw at Computex to feature NVIDIA's proprietary anti-stutter technology. The screen is no mere 1080p cheapie either, instead packing in a hefty resolution of 2880 x 1620. While we haven't benchmarked this laptop yet, we think the twin GTX 965M GPUs should be able to deliver smooth performance on the display despite the high resolution, thanks to the G-Sync support. Running games at 40fps shouldn't be a problem, and this still looks perfectly smooth on G-sync displays.

While G-Sync support mightn't be unique to this laptop, the inclusion of an AverMedia LiveStream chip is. This allows fully hardware accelerated streaming of gameplay from the X5, but we have to question the point of such a chip. It's a nice feature, but with twin NVIDIA GPUs at play, the tiny performance drop encountered when using NVIDIA's ShadowPlay streaming technology would likely be unnoticeable.

Intel's 5th Generation Broadwell CPU is used within the X5, in the form of

a powerful i7-5700HQ, which boosts to 3.5GHz. Another feather in this machine's performance cap is the use of three M.2 SSDs in RAID 0 mode, which is simply incredible (again though, it's by no means unique, as you'll see in our MSI section).

Considering the blistering specs, the quoted price of US\$2299 seems outrageously good; it remains to be seen how the Australia Tax will impact on this when it arrives Down Under. We'd be quite happy to pay anywhere around the \$2800 mark for a machine this powerful though.

AORUS X7 PRO-SYNC

It mightn't be as shiny as the brand-new X5, but Aorus has updated its critically acclaimed X7 to also include a G-Sync display, this time in the form of a 17.3 inch 1080p IPS LCD. Driving this are the same twin GTX 970M GPUs found in the original X7 Pro, which will easily deliver the grunt necessary to run such a conservative display, especially with G-Sync enabled. The rest of the specs also appear to be identical to the X7 Pro; we'd really have liked to see the 4th Gen Core i7-4870HQ upgraded to one of the newer 5th Gen chips, but it wasn't to be.



2

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XTU

CATZILLA
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OVER 30 TOP SCORES AND COUNTING... INCLUDING 10 WORLD RECORDS.

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X99-SOC Champion

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X99-UD4P

MSI

As one of the biggest consumer IT vendors in the world, we weren't surprised to see MSI's booth taking up more floorspace than an A380 SuperJumbo. And to our delight many of the new toys on offer were focused primarily at gamers, a market segment that MSI seems determined to nail. Here's just a few of the products that caught our eye.

MSI GTX 980 Ti GAMING 6G

NVIDIA was one of the few companies to release a major new product at Computex (*cough* AMD *cough*), and it was a killer. The new GeForce GTX 980 Ti is basically a slightly trimmed back Titan X GPU, with fairly minimal changes to the massive slab of silicon that powers its AU\$1500 behemoth. MSI was one of the first companies to show off a product based on this chipset, taking the shape of the GTX 980 Ti Gaming 6G.

This uses MSI's Twin Frozr V cooler which includes the new Torx fan design. This uses a special twin blade design; the traditional blade area forces air downwards while the dispersion fan blade dissipates more air over the heatsink. When combined with the cooler, MSI claims this helps to reduce temperatures by 17% over the standard heatsink design. This has helped MSI to increase the clockspeed of the GPU to 1279MHz when running in OC mode, up from the reference speed of 1075MHz.



You'll find a more detailed review of the GTX 980 Ti elsewhere in this issue, and it'll be interesting to see if it can hold off AMD's newest high-end product, Fury.

MSI 99FXA GAMING

Finding a new AMD-compatible motherboard at Computex was about as easy as finding one of the major manufacturer's stands without a scantily clad booth-babe in front of it; in other words, not easy at all. Yet MSI proudly showed off its new 99FXA Gaming motherboard, which adds a dash of innovation to spice up AMD's aging 990FX chipset.

The first of these are the twin USB 3.1 ports, making it one of the first AMD boards to ship with this blazing external connection option. However, of more interest is the NVMe support, a technology that was driven by Intel. It's basically a new way of accessing memory within SSDs, and should bring huge performance boosts with it. The 990FXA is the world's first AMD-compatible motherboard to

support NVMe and, given the lack of AMD boards at the show, quite possibly will remain the only one.

MSI Z170A-G45 GAMING

Compared to the wealth of information Gigabyte shared with us concerning its Z170 range, we were a little surprised to see MSI basically skirt over its new products based on the same chipset. We caught a very brief glimpse of the Z170A-G45 Gaming motherboard, which appears to be a mid-range board based on the new Skylake-supporting chipset. A few of the features listed on its spec-sheet include twin USB 3.1 ports, along with two M.2 connectors. Other than that, there really wasn't anything of note about this board, apart from the hastily applied label on the PCB, which suggests the display model was a very early engineering sample.

MSI X99A GODLIKE GAMING

Rather than focus on the new Skylake motherboards, MSI spent plenty of time talking up its new Godlike range, head



■■■ The new GeForce GTX 980 Ti is basically a slightly trimmed back Titan X GPU ■■■

Product Features

- Audio Boost 3: Reward Your Ears with True Quality
- Turbo M.2: delivering next generation M.2 Gen3 x4 performance
- 2X Faster USB 3.1: Enjoy the high data transmission speed
- USB Audio Power: Serve Stable 5V Power & Better Signal Transmission over USB
- Killer Networking: Killer Your Lag

Product Spec

- Supports next generation Intel® Core™ processors
- Intel® Z170 Express Chipset
- 4 DIMMs, Dual Channel DDR4-3000MHz
- 3 x PCIe 3.0 x16 slots & 4 x PCIe 3.0 x1 slots
- Supports 2-Way SLI / 3-Way Crossfire
- 2 x Turbo M.2 SSD Slots, 6 x SATA 6Gb/s, 2 x M.2 S.ATA
- 2 x USB 3.1 Gen2, 6 x USB 3.0, 4 x USB 2.0
- 1 x Killer™ Ethernet LAN

ROG STRIX X99-E GAMING **MSI Z170A-G45 GAMING**

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2



of which is this behemoth. While the rest of the market seems to be slowly backing away from the X99 chipset, MSI did anything but, making this board the focus of its gaming range.

This is aimed at those who think buying a new Haswell-E is a good idea, even though Skylake is just around the corner, though we'd have to question the wisdom of such a purchase given that Skylake is meant to introduce decent performance increases over both the Haswell and Broadwell CPU designs. It's specced up the wazoo, starting with a mammoth eight memory slots supporting a crazy 128GB of DDR4-3300. Five PCIe 3.0 x16 slots enables quad-GPU heaven for those with more dollars than sense, and they're using a similar metallic bracket as those seen on Gigabyte's new Z170 high-end. Twin USB 3.1 ports deliver super high speed file transfers, yet there is just one M.2 connection. Killer's new DoubleShot X3 Pro chip delivers high speed networking over twin ports, while the Killer 1535 chip supplies all of your 802.11ac needs.

Yet the biggest feature that MSI wanted to talk about was this board's rather zany lighting system. The board is decked out with multiple LED lights that can be controlled remotely via Android, allowing the user to turn the inside of their case into a colour-controlled disco. We've never seen a motherboard with quite so many lights on it; whether or not such a feature is important to you will depend entirely on how much you like your PC case to act like a strobe light in your darkened gaming den...

MSI CONCEPT GT72

At first glance this looks like another run of the mill gaming laptop, until you see the three IR sensors just below the screen. Powered by Tobii EyeX technology, these can track the user's eye position which can then be used to control in-game camera features. It sounds nifty on paper, but in practice we found it rather unhelpful when controlling the camera in Assassin's Creed. We'd have to look to the side of the screen to rotate the camera, but in

doing so couldn't see what was ahead of or near our character. We only spent a few minutes with the technology, yet it definitely felt like an inferior way to control a camera compared to a mouse or analogue stick. Thankfully the inclusion of a G-Sync display is much more useful, and it wasn't the only MSI laptop on show to feature this.

MSI GT72 2QE

With a retail price of \$3799, this is definitely aimed at cashed up gamers looking for power on the go. Along with the G-Sync display, it also includes NVIDIA's powerful new GTX 980M GPU. Best of all, this is fully upgradeable, with MSI selling upgrade kits for the GPU in the future. It's also packing an incredible four M.2 SSDs in RAID 0 mode, making storage performance absolutely blistering.





1. The Poseidon Z Plus Smart keyboard tracks keystrokes and actions per minute

2. The Theron Plus Smart Mouse tracks clicks and overall distance moved

3. The Poseidon Z Touchbar features programmable capacitive functions

4. The Poseidon Z RGB uses Tt eSPORTS BLUE switches

5. Thermaltake W-Series cases are unbelievably huge

THERMALTAKE

We mightn't always love every single product from Thermaltake, but the company releases so many value-oriented offerings that there's usually a diamond or two hidden amongst the rubble. This year it showed off a couple of rather interesting peripherals offering features unique to the brand.

POSEIDON Z PLUS SMART KEYBOARD AND THERON PLUS SMART MOUSE

These might look like a standard Poseidon Z Plus keyboard and Theron Plus mouse, but the inclusion of a Bluetooth 4.0 module inside each product gives them an ability quite unlike any other. The Bluetooth is used to pipe statistics about the user to

Thermaltake's monitoring software, showing the keystrokes per minute, actions per minute, total mouse movement and other assorted stats. This can then be uploaded to the Thermaltake site to see how the user compares to other

players, and can even unlock certain achievements if they happen to be the fastest mouse clicker, typist or mouse mover in the world. It might sound a little gimmicky to some, but serious eSports players will probably appreciate such granular data on their in-game actions.

POSEIDON Z TOUCHBAR

This was one of our favourite products at the show, as it endows the spacebar with a touch sensor that makes it far more potent than your average thumb-basher. The spacebar can be broken into a maximum of five zones, each of which can be assigned a different action. For example, if you're playing a shooter, the left-most two fifths of the space bar could be jump, while the other three fifths could be assigned to crouch. It's a nifty feature that we're looking forward to trying out when the product launches in the near future.

POSEIDON Z RGB

With Corsair's RGB keyboards proving incredibly popular, we knew it wouldn't be long before Thermaltake would offer its very own RGB keyboard. As expected, it's not using Cherry MX switches,

instead based around the Tt eSPORTS Certified Mechanical BLUE switches. These are the first mechanical switches to come with a five year warranty, and also help to keep the price down, at AU\$149. Like the K70, every key is backed by a tri-colour LED, allowing the user to create an almost infinite variety of pulsing, flowing colour schemes.

THERMALTAKE W-SERIES

Just when we thought Thermaltake couldn't build any cases bigger than its gargantuan Core X9, it wheeled out several uber cases at Computex aimed at those who'd like to smuggle small children through customs inside a PC case. The W100 and W200 are aimed at enthusiasts who want to build extravagant water cooling systems inside their machines, and the latter has room for not one but two full-sized ATX systems! Both will be sold under the new Thermaltake Premium brand, yet the pricing is anything but, with prices for these cases expected to be between AU\$300 and AU\$600. Considering they'll make dandy server boxes, this price point is excellent, though don't expect exceptionally detailed interiors or thick steel construction given the cost.





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U3477PQU 34-inch 21:9

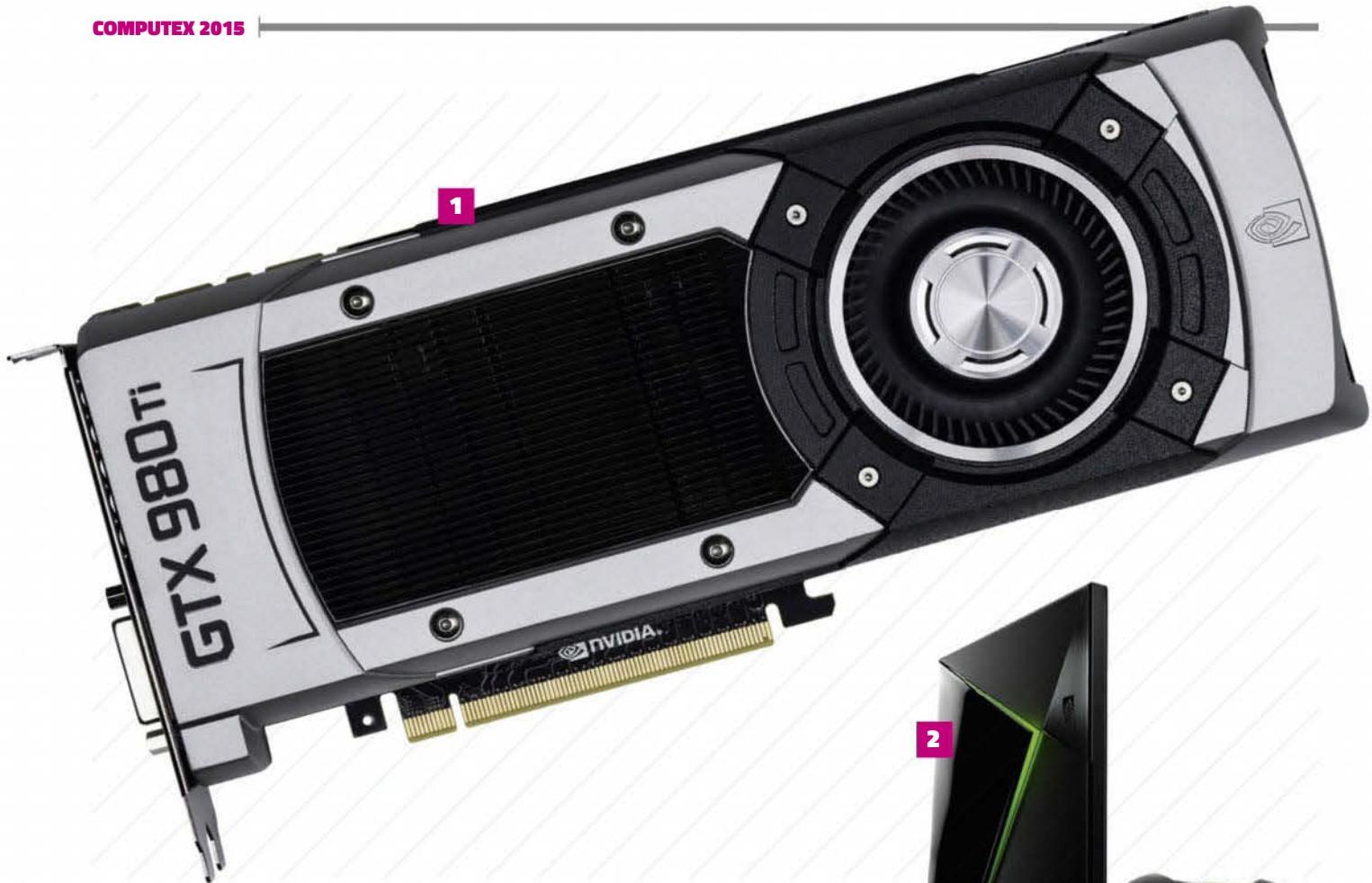
- ❖ AH-IPS Panel
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- ❖ DP 1.2, HDMI 1.4a, MHL, Dual Link DVI, Analog, & RS-232
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- ❖ Ultra Narrow Border



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1. The GeForce GTX 980 Ti comes hot on the heels of the Titan X

2. Some Nvidia Shield Android TV services may not be available in Australia

NVIDIA



Unlike AMD, who chose to launch its new graphics cards two weeks after the world's biggest PC hardware show (Not! Happy! Jan!), NVIDIA used Computex to launch and announce several new products. Best of all was its new flagship consumer graphics card, which offers most of the goodness of a Titan X at a much more palatable price point.

GEFORCE GTX 980 TI

We all knew that NVIDIA had a Ti variant of the GTX 980 waiting in the wings, but nobody expected it to follow so closely in the footsteps of the bank-busting Titan X. The biggest change is in the amount of onboard memory, with the GTX 980 Ti shaving the Titan X's 12GB down to a mere 6GB. Yes, we're being sarcastic, as 6GB is still a helluva lot of memory considering it's running over the same 384-bit bus and 7GHz frequency as the Titan X. A handful of CUDA cores have been removed, down from the Titan X's 3072 to 2816, while the number of Texture Units drops from 192 to 176. Yet the number of ROPs remains the same, fixed at 96. The frequency of the

980 Ti GPU is identical to the Titan X, with a base speed of 1000MHz increasing to 1075MHz under load. There's also a new feature aimed at prospective Oculus Rift owners in the form of Multi-Resolution Shading. Apparently this renders the centre of a VR image at full resolution, but lowers detail around the edges, where the eye isn't focused, saving up to another 30% of performance in the process.

It's obvious from these stats that the 980 Ti chip is basically a Titan X with a few minor glitches that didn't make it through QA testing, and early benchmarks showed it to be just a few percent slower than the Titan X. Yet with Aussie pricing of just AU\$999, the 980 Ti is infinitely better value. Kinda makes us feel sorry for those who spent all that cash on a Titan X though. Whether or not Titan X can fend off AMD's new high-end products remains to be seen...

NVIDIA SHIELD ANDROID TV

We also got a chance to check out the latest Shield product, which now seems to focus mainly on its Android TV



functionality. It's capable of running 4K content thanks to the speedy Tegra X1 SoC used within, but we weren't able to confirm which services will be available in Australia if and when it launches here. A controller is included, and we found it extremely comfortable to hold, even more so than the original Shield control pad. It's also compatible with NVIDIA's new streaming game service, NVIDIA GRID... but once again there's no news on Aussie availability of this service. Given the demand for low-latency servers, we don't think it'll happen any time soon. Thankfully it'll happily stream games from your PC over your home network, but that kinda defeats the purpose of having a gaming PC. Finally, it'll play Android games, and darn well too, thanks to that Tegra chip. Now all we need to know is when it's going to be on sale in Australia.

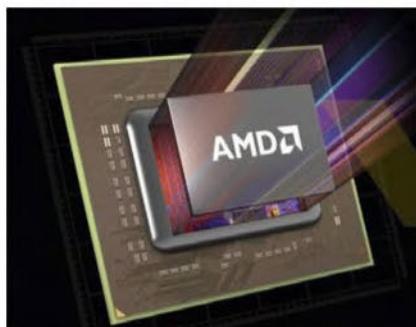


In case you hadn't noticed by now, we're a little bit miffed with AMD. It chose not to reveal its brand new range of graphics cards until a week or two after Computex, which boggles the mind. We can understand it not wanting to go head to head against any other major competing launches, but there was only one, in the form of the NVIDIA GeForce GTX 980 Ti. So just what did AMD reveal at the show?

CARRIZO APU

It's hard to believe that AMD has already hit the sixth-generation in its series of APUs (Accelerated Processing Units), but so it did with the launch of its new A-Series APU, previously codenamed Carrizo. AMD claims that this is the "world's first high-performance APU in a System-on-Chip (SoC) design", and uses new designs for both the CPU and GPU parts of the chip. The former now runs the Excavator CPU design, while the latter adopts the Graphics Core Next design found in today's Radeon graphics cards. There are four CPU cores alongside eight GPU cores, and according to AMD it's a much more power-efficient chip than its predecessor, despite being manufactured on a relatively old 28nm process (Intel now builds its latest chips on a cutting-edge 14nm process). AMD claims a laptop running this new APU will get around 8.5 hours of video back on a single battery charge, up from three hours in the previous generation.

This is the first notebook chip to support Heterogeneous System Architecture 1.0, a way of allowing both the CPU and GPU parts of the APU to access system memory simultaneously. With Microsoft's DirectX 12 due in the very near future as a part of Windows 10, AMD is also betting that its multi-cored APU will notice a significant performance boost thanks to the new API's love all things multithreaded. We're hoping this is true, as AMD-powered laptops are still rarer than hen's teeth, and Intel could surely use a kick in the pants when it comes to competition.



CASE MOD CRAZINESS

As we all know, the best way to show off the power of your PC is to fit it into a truly ostentatious case. There are but some of the case mods we saw on the show floor.





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3



2

COOLER MASTER

1. The Mastercase is designed for off the shelf moddability

2. The Mastercase Pro 5 includes more panels and extras in the base kit

3. The Mastersounds Maker headsets feature a modular design allowing for driver swapping

The opening speech at Cooler Master's behind-closed-doors product reveal sounded more like a Scientology induction than the introduction to a new range of items, with a level of hyperbole rarely seen at technology events. Thankfully the goodies that were unveiled were impressive in their own right, with Cooler Master taking a bold new step when it comes to case customisation.

COOLER MASTER MASTERCASE

At the core of Cooler Master's new range of products is the motto "Make it yours", and it applies perfectly to the new Master Case line. There are three cases in the series, starting with the entry-level MasterCase 5, which is a relatively standard Mid-tower design. It's a rather attractive case considering the suggested price of US\$109, and comes with a raft of premium features. The dual chamber design isolates the power supply from the main motherboard chamber, helping to tuck away messy cables. Up to six 140mm fans can be mounted, along with three, extra-long, dual-slot graphics cards.

Most of the interior components can be moved around thanks to the modular design, allowing users to customise it to their specific build.

However, the real innovation is in the upgradability of the case. Cooler Master will be selling replacement sides, fronts, tops, handles, and drive bays. While we weren't privy to the entire range of optional extras, there should be enough to be able to build a case that is unique to the user's tastes. The next case in the range is the MasterCase 5, followed by the MasterCase Maker 5, and they all share the same basic skeleton. Where they differ is in the various panels and extras included with the case, and it's possible to buy upgrade kits to convert a MasterCase 5 up to a Pro 5 or Maker 5, the latter of which has a suggested price of US\$149. It's a very interesting idea, and opens the door up to cool possibilities such as licensed gaming-themed side panels, or custom-painted front facias. Our only concern is that users will find it hard to imagine what their case will look like when customised with these additional pieces, as well as the additional cost of buying extra components. Still, props to Cooler Master for trying something different.

COOLER MASTER MASTERSOUNDS MAKER

The ethos of "Make it Yours" extends to Cooler Master's new headset, the MasterSounds Maker, which was easily one of the most innovative products at the show. Like its new MasterCase series, these headphones use a modular design, allowing the user to swap in different drivers depending on their needs. The baseline set is tuned for games, but they can be swapped out for music or studio drivers, each of which lends the soundscape a different flavour. Changing the drivers is as simple as twisting the special up in each earpiece, and screwing the replacement back in. It's a fantastic idea, but we're very keen to hear how they sound in action. They appear to be rather high-end cans, with built-in active environmental noise cancelling, as well as virtual 7.1 surround sound (no mention of which codec they're using though). Connectivity is also configurable, with the user able to choose from Bluetooth, wired or USB.



BEAT THE BUFFER

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The latest in router technology has arrived! The new [Linksys EA8500 Max-Stream AC2600 MU-MIMO Router](#) provides up to 3X faster performance for all devices* on its network — it's like having an individual wireless router dedicated to each device.

MU-MIMO sends Wi-Fi to all devices simultaneously, so your smartphones, laptops, and consoles connect at the same time, without slowing down your network.



HOME NETWORKS: MORE CROWDED THAN EVER

The average home regularly has 8+ devices connecting to the Internet — and not just for email.

- 87% of people say they simultaneously stream videos and play games, stream music, or surf the Web on multiple devices.
- More than half of users frequently or always experience buffering, interruptions, or other performance-related issues while online.

We all want our Wi-Fi to deliver the coverage and speed needed for the heavy-bandwidth activities of our households.

Now, with breakthrough MU-MIMO technology you can stream movies without interruption, game without lag, and enjoy faster connection on every device, all at the same time.

SOURCE: IDC InfoBrief, sponsored by Linksys, The Home Network, Our Neglected Workhorse, published May 2015. For this report, IDC conducted a survey of 1,002 United States adults living in households of 3+ people in March 2015. This study was designed to determine how adults use their Internet-connected devices at home and their possible points in streaming video, audio, or online games.

* Three or more 1x1 MU-MIMO-enabled client devices must be connected to achieve the three (3) times faster physical data rate.



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1



2

1. The ASRock G10 Router has features to match its looks

2. The ASRock Z170 Extreme7 is a premium Skylake offering

3. The tiny ASRock BeeBox can stream 4k video thanks to the inclusion of dual channel memory

ASROCK


This subsidiary of ASUS has always been a favourite booth visit of ours at Computex, as the company always seems to have something out of the ordinary on display. ASRock did not disappoint, with one of the coolest routers we've ever seen, along with a beastly mini-PC and some damn sexy motherboards.

ASROCK G10 ROUTER

Soaring straight to the top of our Most Wanted list is this stunning new router from ASRock. It's not just the outrageously gorgeous design of the exterior case; there's a lot to love inside as well. For starters, it's a 4T4R (4 transmitters, 4 receivers) 802.11ac router, which means that it's the first

consumer router rated to deliver a throughput of 1733Mbps over a single WiFi application. There's one slight hitch with this – we don't know of any 4T4R WiFi cards for the PC, as the fastest we've seen so far is 3T3R in commercial applications.

Even cooler is the hidden 2T2R WiFi dongle hidden in the top, which detaches to become a travel access point or HDMI dongle, enabling Miracasting. Sadly it can't be used as a WiFi dongle though. The final feather in this router's cap is the IR blaster hidden within, which can be programmed to run your IR-controlled gadgets remotely. Simply make sure the router is within view of your TV or airconditioner, and then you can control it remotely, setting your TV up to record a show while you're on the road, or turning your heater on 30 minutes before you get home. It's hard to believe that ASRock is anticipating on selling this router for just US\$250 at the end of July, but if it can hit this price point it'll be the hottest selling router on the block.

ASROCK Z170 EXTREME7

Welcome to ASRock's premium motherboard for Skylake users. While

detailed information about this board was thin on the ground, we did gather a few key bits of intel. Firstly, it has an insane three M.2 connections, and they're all of the fastest PCIe 3.0 x4 variety. It's also got 12 phase power, which should ensure it'll overclock Skylake like nobody's business, and it's one of the few Z170 boards rated to run professional graphics cards such as NVIDIA's Quadro series (most other manufacturers at the show only promoted their X99 as having been ratified to work with pro graphics cards). Finally, it's packing ASRock's new Purity Sound 3 audio solution, which should be using Realtek's latest audio chipset.

ASROCK BEEBOX

Ultra small PCs taking aim at Intel's NUCs were a dime a dozen at this year's Computex, but the BeeBox has one key feature that makes it stand out from the pack. According to ASRock, it's the only NUC-sized box that can stream 4K video thanks to ASRock's inclusion of dual channel memory. This is in contrast to other mini-PCs that can only output a 4K image, not 4K playback, thanks to their single channel memory.



3



NVIDIA
G-SYNC™

NVIDIA.
SLI®

2.29 cm / 2.5kg

Earth's Most Powerful 15" 15.6" GEFORCE GTX 965M SLI GAMING LAPTOP XS



NVIDIA® GeForce® GTX
965M SLI GDDR5 8GB



NVIDIA® G-SYNC™
Technology

3K
2880x1620

3K WQHD+
IPS Display



5th Gen. Intel®
Core™ i7 Processor



Built-in Hardware
Video Encoder



XSplit Gamecaster
Streaming Software



13" X3 V3

15" XS

17" X7 PRO-SYNC



www.aorus.com

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FRAG LABS
THE SCIENCE OF GAMING



1. The MG279Q features a 144Hz, 2560x1440 IPS panel

ASUS



2. The MG278Q boasts a 1ms response time

3. The 3800R features an ultra wide, 21:9, 3440x1440 curved display as well as G-Sync

Last but not least is the giant manufacturer of all things PC, ASUS. As usual it had one of the biggest booths at the show, yet surprisingly didn't reveal too much about its upcoming range of new Intel motherboards. The Republic of Gamers area also didn't have quite as many new reveals as we've seen in the past, suggesting ASUS is holding its cards close to its chest about imminent product launches.

FREESYNC IN THE HIZZOUSE

Two key products on display in the red-zone, aka Republic of Gamers, were ASUS' new gamer focused displays, the MG279Q and MG278Q. Both ship with AMD's new FreeSync technology, while also updating at the stupidly fast rate of 144Hz. They're also both WQHD panels, with a resolution of 2560 x 1440, but the MG279Q differs in that it uses an

IPS panel for ultra-wide viewing angles of up to 178 degrees. On the other hand, we assume the MG278Q uses a standard TN panel, as it offers a very fast pixel response time of just 1ms. Both feature Ultra-Low Blue Light and Flicker-Free technologies to lower eye fatigue. No word yet on pricing – here's hoping they're considerably cheaper than the first batch of FreeSync displays we've seen.

ASUS 3800R 34" G-SYNC DISPLAY

Continuing the theme of displays, ASUS had one of the sexiest monitors of the show at its stand. The 3800R is an Ultra Wide display with an aspect ratio of 21:9. However, it's got a nice curve to it that makes it very comfortable to use at close range, while the 3440 x 1440 native resolution ensures pixels remain almost impossible to spot. Best of all it includes NVIDIA's G-Sync technology, which should allow lesser systems to drive so many pixels smoothly.

USB 3.1

ASUS shied away from sharing too many details about its new Z170 motherboards, instead preferring to focus on the inclusion of USB 3.1 across most of its product range. It'll arrive in two formats – either as an integrated solution on the motherboard (these products will have U3.1 in the product name) or as an add-in USB 3.1 card (these products will have USB3.1 in the product name). Both USB Type A and Type C connectors will be available.

TURBO GRAPHICS CARDS

ASUS is rolling out a new range of graphics cards known as the Turbo series, and these are aimed at system builders. They're not quite as high-end as some of the more expensive ROG products, but they're also not quite as cheap as the most affordable products, instead occupying the middle ground in ASUS' range.

ANTEC

Although they showed off a number of products on the show floor, Antec's Computex was essentially all about one thing – one of, if not the most beautiful case we've ever seen.

ANTEC SIGNATURE S10

Not a cheap case by any means, setting punters back a cool \$499 USD (that's a little over \$650 in Australian play money), the S10 still has a hell of a lot going for it, and it's not just the stunning good looks. It's big and heavy, standing 60cm tall and 59cm deep, tipping the scales at 18kg, but behind the easily opened side panels hides a unique three chamber design that not only allows for extra and more efficient cooling, but more space to fit components comfortably. The entire front chamber is reserved for HDDs and features a fan that blows directly over the drives to keep them cool. This chamber is air-gapped from the rest of the PC, meaning that any fans in the main body of the case blow directly onto the MOBO and videocard rather than blowing across drives before cooling the hotter components. The lack of drives in the main chamber also means that the S10 has ample room for four 12.5" videocards. The bottom chamber houses the power supply and up to five 2.5" drives, and an air gap below the lower chamber allows the PSU fan to blow directly out of the case. For ease of cleaning, each of the seven fans that come stock with the case has a removable micromesh filter. The only thing the S10 doesn't have is space for is an optical drive.

**OCZ**

It wasn't too long ago that SSD manufacturers ranked themselves solely on the basis of read/write speed rather than overall performance, durability and reliability. As OCZ demonstrated on the Computex show floor, this is something they are getting away from. It is true that the storage maker has released a 240 - 960Gb PCIe SSD dubbed the RevoDrive 350 with an incredible max bandwidth of 1800MB/s, but far more important is the support the manufacturer is throwing behind their products.

The entire OCZ range, from the budget ARC 100 series all the way through to their extremely expensive RevoDrive 350 comes with at least a three year warranty, going all the way up to five



years in the case of the Vector 180 series. The performance difference between value SSDs and high end SSDs also seems to be slimming, with bandwidth differences that will be barely noticeable for anyone not involved in something that takes long sustained data transfer or computation, such as video rendering or maintaining a high speed server. Now could be the time to seriously consider starting to replace tradition storage drives with much faster budget SSDs.



ROCCAT

Peripheral maker Roccat didn't have a huge amount to show in their small meeting room in the Taipei Hyatt, but what they did have was quite impressive.

NYTH MOUSE

Labelled as an MMO mouse, but in reality a mouse suitable for anyone interested in customising their experience, the Nyth not only features interchangeable sides to make it wider or thinner depending on your preference, it also features space for up to 16 side buttons that can be swapped, moved or removed entirely depending on need. The new Roccat Swarm drivers and software suite finally unifies the driver/software package, and from what we've seen, setting up button and user profiles in the software will be a breeze, with a simple drag and drop system allowing users to choose button placement and layout for each gaming profile. The company also promises to release templates for buttons online so users can 3D print their own unique buttons for an additional level of customisation. The mouse also features

a rocker switch that sits between the first and middle fingers of the hand. It essentially takes the rocker functionality often seen in mouse wheels and transplants it to further up the body of the mouse. We're already envisaging this switch being used for leaning in FPS or quick swapping weapons.

RYOS MK FX

Taking advantage of Corsair's expired exclusivity agreement with rockstar mechanical switch manufacturer, Cherry, the Ryos MK FX uses RGB Brown switches on all keys aside from three specially placed thumb accessible macro buttons. These three buttons located under the spacebar are freely programmable. The FX in the name refers to Alien FX, technology built in collaboration with Alienware that uses the RGB lighting in the keyboard to respond to action in the game. So far there are 35 supported by the technology but without doubt more will be added soon.

**FRACTAL DESIGN**

In keeping with the Swedish design studio's low key, elegant design aesthetics, Fractal held their showcase not on the busy show floor or in a hotel suite but rather in a low key, elegant whiskey bar in downtown Taipei. The makers of by far our favourite case in our recent Budget Case Roundup, the brilliant Define S had another excellent looking case on show.

NODE 202

The first case Fractal has designed with form being the initial design priority over function according to Fractal reps, the Node 202 is a lovely looking compact Mini-ITX case that would look at home in any TV stand or cabinet thanks to the simple, understated design and the fact that it works equally well vertically or horizontally. Despite the small form factor – the complete volume of the case is a rather petite litres – the Node 202 has enough space inside to fit a 310mm videocard. That's more than enough room to fit the vast majority of today's most powerful cards. Although real estate is at a premium, the interior of the Node 202 is chambered for more efficient cooling of components. The case can also be bundled with a Fractal Design Integra SFX 450W power supply with specialised cables designed for the case to ensure there is no tangling or clutter. Bare bones, the Node 202 will set you back around \$100, almost double that if you opt for the integrated PSU.

ASRock



Beebox

Small, Fast, Quiet

The World's First Intel NUC Mini PC with a USB Type-C Port



Black

Gold

White



WHERE THE CHIPS MAY FALL

At the heart of your gaming rig is the artificial brain known as the CPU. BENNETT RING examines both Intel and AMD's range to see which is best for pushing polygons, with surprising results.

Compared to the headlong race towards photorealism that today's GPU makers are engaged in, the CPU battle has become a rather tedious affair. While AMD and Intel used to go neck and neck in the past, today the CPU wars are dominated by Intel, as its chips simply outperform AMD in nearly every regard. Every year we see AMD release a refreshed, updated version of its major CPU families, and every year we see it fail to match Intel's effort from the previous year. With absolutely no pressure to deliver exciting performance improvements, Intel has instead continued to release new CPUs that are only slightly faster than the last model, which is just enough to keep them well in the lead. So why bother upgrading? That's a darn good question.

DIRECTX 12

There's a game changer on the horizon in the form of Microsoft's DirectX 12. When CPU manufacturers hit a thermal wall almost a decade ago, halting their rapid increases in CPU frequency, they instead had to endow their CPUs with multiple cores to deliver bigger, better chips. Each CPU core is, in effect, basically an individual CPU, but several of these cores are now packaged together to make up a CPU. AMD

was the first manufacturer to release eight-core CPUs, while Intel took its sweet time getting around to releasing quad-core processors. There was one major problem with this approach though – software simply wasn't built to accommodate multiple CPU cores.

This type of programming is known as multithreaded coding, and developing multithreaded software is much harder than running it on a single CPU core. It's only in the last couple of years that we've seen games start to take advantage of multiple CPU cores, but there was yet another hurdle in the way of utilising all of these extra transistors. DirectX 11, the foundation upon which most PC games are built, was created back in the single-threaded days, and couldn't utilise the extra resources afforded by multiple CPU cores.

Enter DirectX 12, which is quite possibly the most exciting thing to happen to PC gaming in the last five years. Built from the ground up to leverage multiple CPU cores, we can expect performance boosts of anywhere between 50% up to 1000%, depending on the type of application and the processor it's being run on. Early leaked benchmarks suggest DirectX 12 will finally give AMD CPUs the leg up they so desperately need.

Unfortunately we don't have any reliable DX12 benchmarks yet, so we're going to have to stick with tests that show how these chips perform today. Given that it's going to take software

developers a year or two to figure out how to best use DX12, it's probably wise that we focus on performance today, and not where it'll be in the next 24 months. Besides, by then Intel will probably have rolled out eight cores to even the budget versions of its chips.

HOW WE TESTED

We ran three benchmarks on these CPUs. 3DMark's Physics test is excellent for testing multithreading, while Cinebench R15 instead only looks at the performance of a single core, highlighting just how much faster Intel's cores are compared to AMD's. The final test is GTA 5, one of the few games that relies heavily on both strong individual core performance, as well as multi-core configurations.

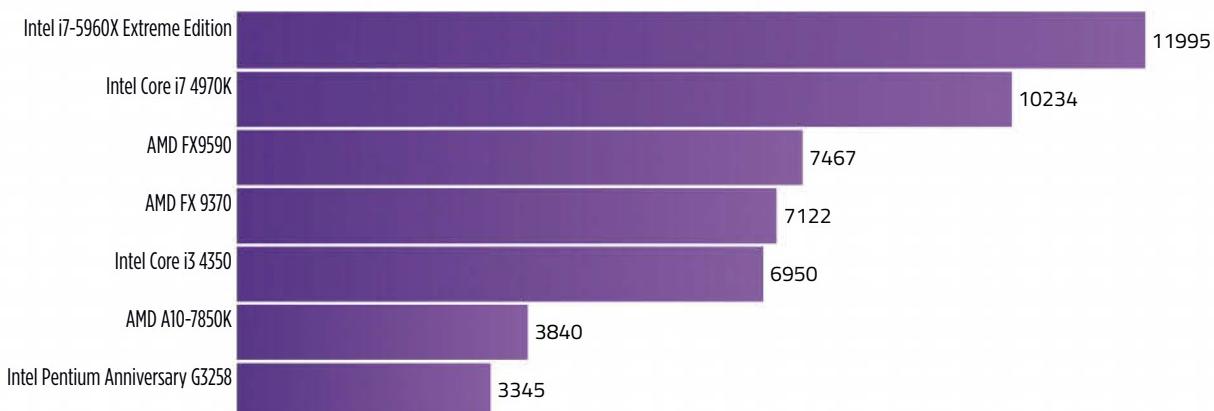
CPU Pricing

Intel i7-5960X Extreme Edition	\$1,419
Intel Core i7 4790K	\$460
AMD FX 9590	\$315
AMD FX 9370	\$285
Intel Core i3 4350	\$159
AMD A10-7850K	\$179
Intel Pentium Anniversary G3258	\$90

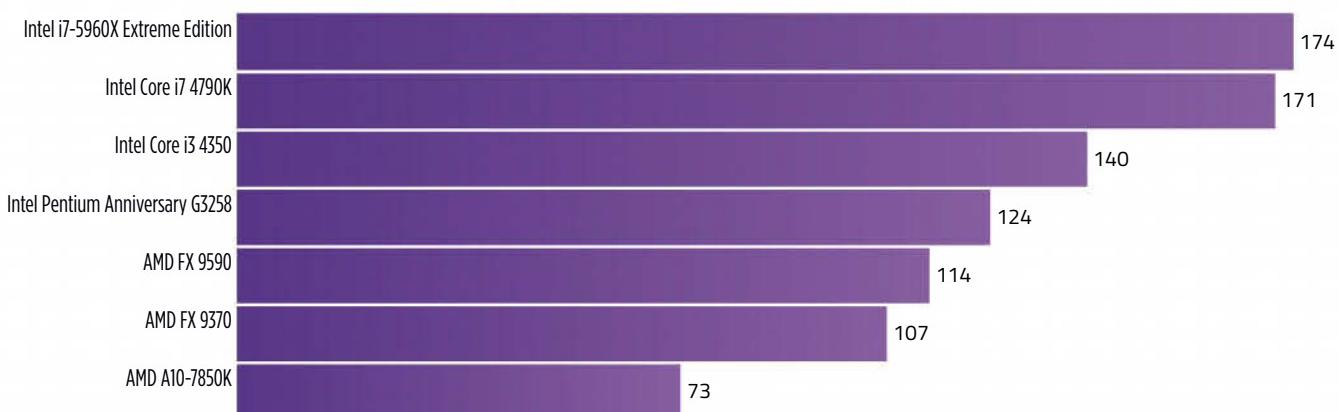
■■■ There's a game changer on the horizon in the form of Microsoft's DirectX 12 ■■■

CPU Benchmarks

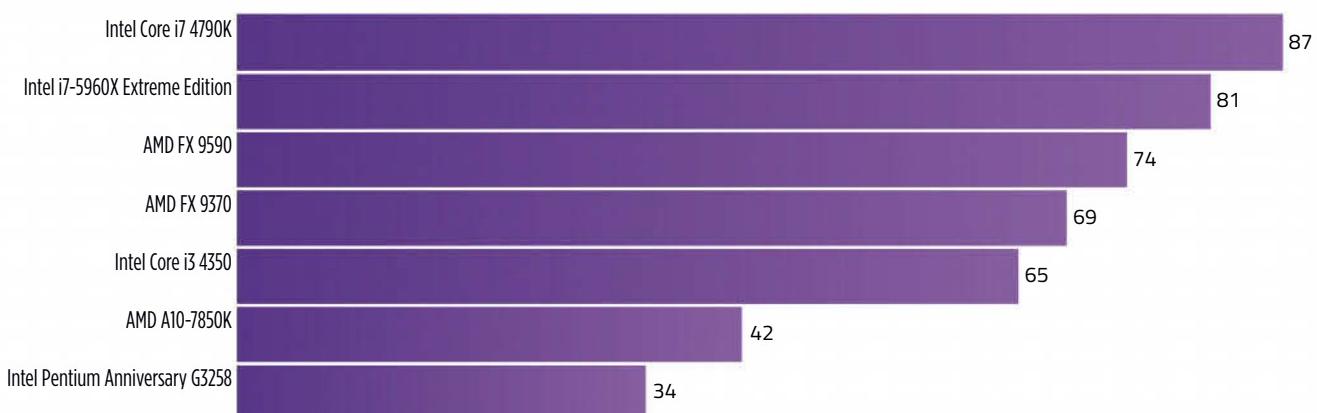
3DMARK Physics Score (higher is better)



CINEBENCHR15 Score (higher is better)



GRAND THEFT AUTO V Average frames per second



Intel i7-5960X Extreme Edition

Don't believe the hype

PRICE \$1419
www.intel.com.au

Welcome to the granddaddy of Intel's range of CPUs. Priced at more than triple that of its nearest Intel brethren, this is as expensive as it gets... but you'd be slightly insane to part with your moolah for this brute.

The reason it costs so much is that it's Intel's first eight-cored CPU for the consumer market. It's built on Intel's 22nm process, and is comprised of 2.6 billion transistors. Unlike all of Intel's other consumer chips, it uses the LGA 2011-3 Socket design, which is currently tied to the X99 chipset. Sadly this means upgrading from your old i7 2700K to this CPU isn't possible without buying an entirely new motherboard, and X99 also requires DDR4 memory, making this one painfully expensive upgrade process.

While having eight cores is nice, and

should yield real boons when DX12 lands, it brings thermal issues to the table. After all, eight cores runs hotter than four, so to get around this Intel has had to drop the frequency of the cores. When Intel's Turbo mode kicks in, the maximum official frequency supported by this CPU is just 3.5GHz, well below the 4.4GHz of Intel's \$400 i7 4790K. This means it'll actually perform considerably worse in games that don't make use of more than four cores... which is most of them (unlike GTA V, which seems to love extra cores). As such, we simply can't recommend this chip unless you're also going to be making heavy use of multi-threaded applications such as video editing or 3D rendering. BENNETT RING PC



- Eight cores
- Relatively low TDP
- Extra PCIe great for quad-GPU PCs
-
- Slower than the i7 4790K in most games

VERDICT:

Unless you're moonlighting as a 3D renderer or video editor, this chip is simply overkill for your games.

7

Intel Core i7 4790K

The king of gaming CPUs

PRICE \$460
www.intel.com

Welcome to PC PowerPlay's favourite gaming CPU. Sure, it's also one of the most expensive, but what's \$100 between friends? It might not be a massive improvement over a trust old i7 2700K overclocked to 4.5GHz, but there's no denying that this is the fastest gaming CPU on the market.

Built using Intel's Haswell design, the remarkable feature about this chip is that it has the fastest Turbo frequency of any product Intel has launched. When the going gets tough, each of the four HyperThreaded cores within will clock themselves at a blistering 4.4GHz, which is more than enough to decimate even the most demanding game. The K at the end of the model name signifies that this chip is also aimed at overclockers, as it includes a fully unlocked multiplier. Depending on how lucky you are, not to mention how extreme your cooling setup is, it's possible to get these chips to run at anywhere up to 5GHz, though

4.8GHz seems to be the average.

As our benchmarks show, this CPU has what it takes to beat all comers, including Intel's own \$1400 super chip, the Extreme Edition. In fact, it even beats the Extreme Edition in GTAV, proving that this is the best gaming CPU on the market. These excellent results hammer home just how far AMD is behind Intel, but until it catches up we have no hesitation in recommending the i7 4790K for those who can afford it.

BENNETT RING PC



- Top-shelf performance
- Factory unlocked
- Cool operating temps
-
- Rather expensive

VERDICT:

If you're looking for the finest CPU for your gaming rig, this is it.

10

Intel Core i3 4350

Intel's value offering packs a punch

PRICE \$159
www.intel.com

Considering this cheap is even more affordable than many of AMD's range, there's got to be a catch, right? And there is, although it's one that will only arise in the most recent of games, say those released in the last year or two. Intel has cut costs by making the i3 4350 a twin-cored CPU, which means it will truly struggle to run games that rely heavily on multithreading, such as Battlefield 4. On the other hand, it's fine to run older titles that only utilise a single CPU core.

Being built on the Haswell architecture, this CPU is made using the 22nm process that is soon to be replaced by Broadwell's 14nm process. Despite only having twin cores, it comes with Intel's Hyperthreading technology, which, without going into too much detail, allows the two cores to be seen

as four cores in certain applications. The base speed is 3.6GHz, but the lack of a Turbo feature means this the speed it's stuck at 24/7, and the lack of a K designation means it's multiplier locked, negating any overclocking potential. Those of you silly enough to try integrated graphics for gaming will find the integrated Intel HD 4600 graphics to be far too slow for anything more detailed than Hearthstone.

As our benches show, in single threaded apps like Cinebench the i3 4350 is a potent little performer, but it lags behind when more than two cores are required. As such it'll make a decent CPU for a dedicated retro gaming or HTPC box, but doesn't have what it takes to run today's most demanding games. *BENNETT RING PC*



- Great price
- Speedy at single-threaded apps
- Very low TDP
- Only twin cores hurts it in modern games

VERDICT:

Sadly the lack of four cores makes this budget offering no good for modern games, while the Pentium G3258 is better value for single-threaded titles.

6

Intel Pentium Anniversary G3258

What a way to celebrate

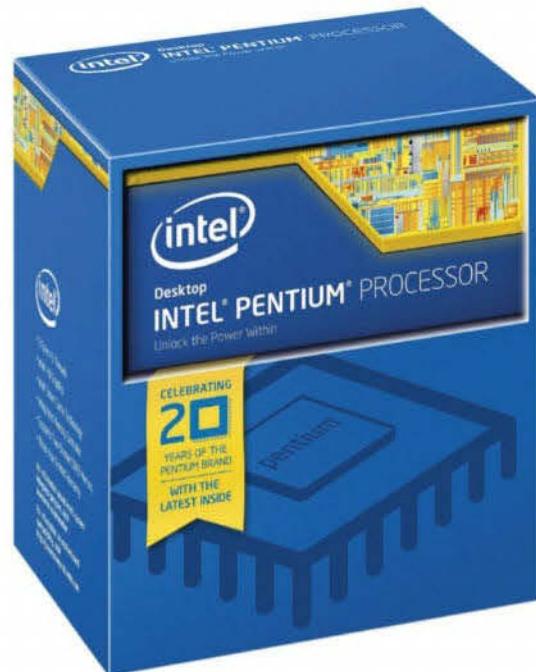
PRICE \$90
www.intel.com

Released to celebrate the 20th anniversary of Intel's Pentium brand, the Anniversary Edition soon had the attention of tweakers around the world. It turned out that this humble little birthday present was able to overclock by 40% with relative ease, turning it into quite the powerhouse. Note that it doesn't have the K designation, but Intel released it with an unlocked multiplier.

With a stock speed of 3.2GHz, this easy overclock bought it up to a blazing 4.6GHz or so, with many users even managing to hit a 50% overclock at 4.8GHz. There's one catch though – it's only a dual core critter, and doesn't even have Hyperthreading to help alleviate the lack of processors when running normal desktop apps. It's also got a relatively small cache, at just 3MB.

We ran our Pentium at stock speeds, which showed that it's still a potent little performer in single-threaded applications such as Cinebench R15's single-thread test. However, heading to the GTAV benchmarks shows just how crippled this CPU is when it comes to games that are heavily reliant upon multi-threading. This test result was mirrored in 3DMark's Physics test, which will eat up as many cores as you can throw at it.

Still, at just \$90, this is our preferred chip for casual gaming, NAS and media boxes, especially once it's been given a kick in the pants via overclocking. Sadly it's not much good for anything else, even when compared against AMD's relatively lacklustre offerings. *BENNETT RING PC*



- Incredibly cheap
- Amazing overclocker
- Solid single-core performance
- Only two cores
- Lacking cache

VERDICT:

It might overclock like the clappers, but the lack of extra cores really hurts the Pentium's gaming performance.

7

AMD FX 9590 and 9370

The first to 5GHz!

PRICE \$315 AND \$285
www.amd.com

In the good old days, the frequency of a CPU was a great way to measure how fast it was, but those days are long gone. In case you needed any proof, the AMD FX 9590 is it. With a top speed of 5GHz and quad-cores, we wouldn't blame you for thinking it's going to be a killer CPU, but the benchmarks show otherwise. The 9370 is simply a slower clocked variant of the 9590, with a top speed of 4.7GHz.

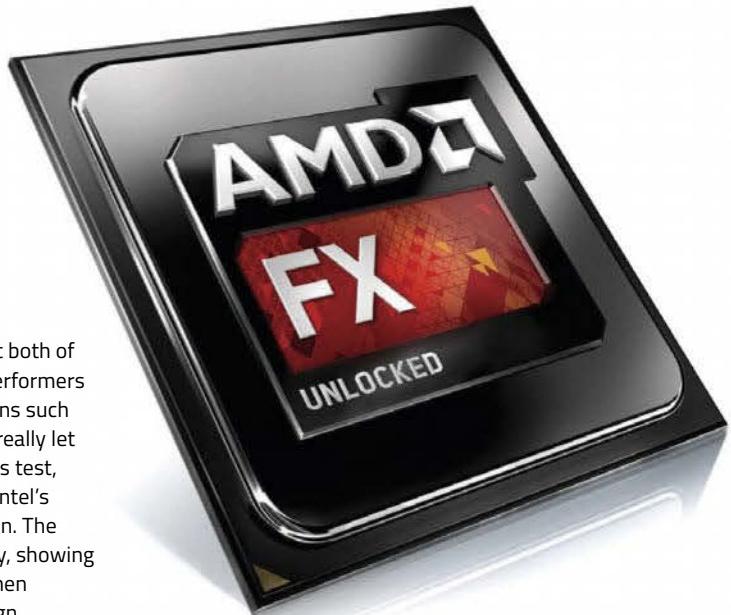
Both CPUs are based on AMD's AMD3+ socket, and use the Vishera core. This is built on a rather archaic 32nm process, which could explain why both CPUs are extremely hot. With a TDP of 220W, they're almost twice as hot as Intel's cooler chips, and will require serious cooling to operate. AMD offers the 9590 with a water cooling kit as a bundle, but our pricing

reflects the standalone price without cooler.

Our benchmarks show that both of these chips can be capable performers in heavily threaded applications such as GTA5, but the weak cores really let it down in the 3DMark Physics test, where both chips lag behind Intel's chips by a considerable margin. The Cinebench test highlights why, showing just how slow each core is when compared to Intel's core design.

As a result we're hesitant to recommend these chips. While they're probably fine in GPU limited games, if the CPU is ever leaned on heavily we're not confident that these AMD chips will be able to handle the load. And it's better to be safe than sorry, even if you could save \$100 in the process.

BENNETT RING PC



- 5GHz is impressive
- Decent price point
-
- Extremely hot
- Weak single-core performance

VERDICT:

Sadly these CPUs illustrate just how far AMD is behind Intel when it comes to the performance of each CPU core.

6

AMD A10-7850K

Great integrated GPU, poor everything else

PRICE \$179
www.amd.com

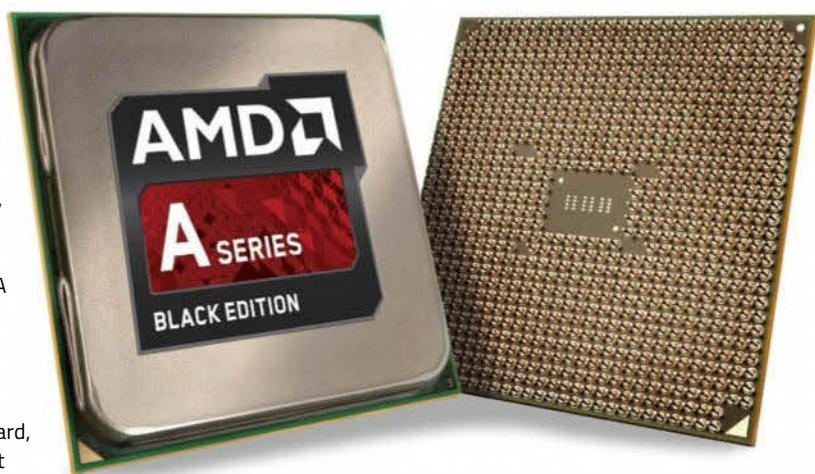
The A10 series shows how AMD is choosing to differentiate itself from Intel. In raw CPU vs CPU performance, it simply can't keep up, and has been losing this race for several years now. However, AMD has the Radeon brand and team up its sleeve, which it has cleverly employed on its APU series of processors, and the A10-7850K is a great example of the end result.

On the CPU side, this is uses a quad-core CPU based on the Kaveri architecture. The maximum Turbo speed tops out at 4GHz, and when combined with the relatively low core performance of AMD products, explains why this product didn't fair too well in our benchmarks. However, this APU also has integrated graphics, just like Intel's latest products, but with one key difference – they don't suck anywhere near as much as Intel.

While we didn't benchmark the graphics performance, rest assured that this APU's integrated GPU runs

rings around Intel's HD Graphics. It's still not good enough for serious gamers like PC PowerPlay readers, but it is fine for casual gamers looking for an affordable LoL or DOTA box. It's even possible to run the integrated graphics in CrossFire mode with a cheap Radeon HD graphics card, which will bring decent gaming performance to the table for a minimal price.

We still don't see many AMD APUs in the wild, as most manufacturers are still sticking with Intel despite the superior graphics performance of the A10. As far as serious gamers are concerned, where discrete GPUs are the order of the day, the A10 doesn't have the CPU performance to cut it. BENNETT RING PC



- Excellent integrated GPU performance
- Low price
- Quad core
-
- Poor single-core performance

VERDICT:

This is a viable alternative for those looking to build an incredibly cheap casual gaming box, where a discrete GPU would bust the budget.

7

SAPPHIRE NITRO Series.

PC gamers. Welcome to the next level.



NITRO R9 390
Radeon™ Graphic Accelerator



NITRO R9 380
Radeon™ Graphic Accelerator



NITRO R7 370
Radeon™ Graphic Accelerator

SAPPHIRE **NITRO**

For the majority of PC gamers

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MOTHERBOARD MAYHEM

BENNETT RING looks at the best gaming boards on the market, covering the big four brands.

As the backbone to your PC, the motherboard can make or break your build. Yet with dozens of different motherboards on offer, all with confusing names and wildly intimidating lists of specifications, choosing the right one isn't a simple affair. We're here to point you in the right direction, looking at eight motherboards designed from the ground up for gamers. Before we look at each board, we're going to give you some helpful pointers to understand the myriad of jargon associated with motherboards, helping you to decipher exactly which features you need, and which are a waste of money.

MOBO JARGON 101

CHIPSET: this is the silicon that powers the motherboard, and Intel currently has two chipsets compatible with its Core series of processors. The H97 is a budget oriented chipset, and lacks the overclocking and SLI support of the more expensive, enthusiast oriented Z97 chipset (it does support AMD's CrossFire though). However, some smart mobo-makers have figured out how to enable overclocking on the H97. Intel's X99 chipset is limited to its supremely expensive Socket 2011-3 Extreme Edition CPUs. Meanwhile AMD has the 900 series chipset, with the 990FX being the flagship chipset that supports SLI and overclocking.

SOCKET: This is the area where the CPU plugs into the motherboard, and it's crucial that you buy the right socket for your chosen CPU. Intel's mainstream Core range use Socket 1150, while their Extreme Edition CPUs use Socket 2011-

3. AMD boards use Socket AM3/AM3+ or FM2/FM2+.

M.2: welcome to the new type of connection for high-speed SSDs. It comes in two flavours – x2 and x4, with the latter offering twice the bandwidth of x2. Note that enabling an M.2 connection can often disable one of the PCIe slots on the board, due to PCIe lane limitations.

SATA EXPRESS (SATAE): the other new type of connection for high-speed SSDs, SATAe isn't anywhere near as popular as M.2 on motherboards or SSDs.

PCI EXPRESS (PCIE) LANES: The motherboard chipset supplies a set number of PCIe lanes to power peripherals. Only certain items use PCIe though, such as graphics cards, sound cards, anything that plugs into a PCIe slot and M.2 or SATAe SSDs. If you're running multiple GPUs plus several M.2 or SATAe SSDs, it's possible to run out of available PCIe lanes. Find out how many PCIe lanes your motherboard chipset delivers, then subtract the number of PCIe lanes each peripheral needs to figure out if you're going to run out of PCIe lanes. PCIe lanes can come in either the 2.0 or 3.0 variety, with the latter offering higher bandwidth.

PCI EXPRESS SLOTS: These are the physical slots on the motherboard used to plug graphics cards and other peripherals into the board. They come in various lengths of x1, x2, x4, x8 and x16. Note that the length of the slot doesn't always equal the number of PCIe lanes it uses; many x16 slots only deliver eight lanes of PCIe bandwidth. Be aware that using more PCIe slots can cause them to

run at slower speeds, due to the limited number of PCIe lanes.

SATA 3 PORTS: today's mainstream SSDs, mechanical hard drives and optical drives all connect to the motherboard via SATA 3 ports. The more of these a motherboard has, the more drives you can connect.

POWER PHASES: Without delving into too much detail, the higher the number of power phases on a motherboard, the cleaner and more stable the power provided to the CPU should be. This is especially important for overclockers, who favour motherboards with extra power phases (such as a 12 phase power system). Having said that, the quality of the components used within the power delivery system will also impact the quality of the electricity flow.

MOBO Pricing

ASRock Fatal1ty X99X Killer	\$409
ASRock Fatal1ty 990FX Killer	\$199
ASUS H97-Pro Gamer	\$165
ASUS Maximus VII Ranger	\$245
Gigabyte H97M-Gaming 3	\$135
Gigabyte X99-Gaming 5	\$399
MSI H97 Gaming 3	\$155
MSI Z97 Gaming 5	\$189

ASRock Fatal1ty X99X Killer

Intel's value offering packs a punch

PRICE \$409
www.asrock.com

If money is no obstacle, and you really want one of Intel's Extreme Edition Socket 2011-3 CPUs for your systems despite our advice not to, this premium board from ASRock is intended for you. ASRock has endowed this expensive board with a raft of high-end features, but it's still not quite up there with our favourite X99 models that cost just a little more.

Three PCIe 3.0 x16 slots support three-way GPUs from either NVIDIA or AMD, but it's one short of the four offered on similar X99 boards. There are only two more PCIe x1 slots, along with a single M.2 PCIe 3.0 x4 connection. A mini-Pcie slot is also included, suitable for Mini-Pcie WiFi cards or similar. Both Intel and Killer Ethernet is provided, though we'd stick with the former if you want to avoid software issues. Sadly WiFi isn't included in the box, a shame considering the price. Ten SATA 3 ports are plenty for even the

most data-hungry drive owners.

The 12-phase power system helps this board to become a potent overclocker, but the Purity Sound 2 onboard audio isn't quite as good as competing boards, as it uses the Realtek ALC1150 codec, albeit beefed up with high quality amps and audio capacitors. The Fatal1ty mouse port is nothing more than a gimmick, as we noticed absolutely no difference between this and a regular mouse port. While there's plenty to like about this board, it falls well short of our favourite X99 behemoth, Gigabyte's GA-X99-Gaming G1 WiFi, which outclasses it in most areas. *BENNETT RING PC*



- Excellent power solution
 - Plenty of SATA ports
 - Affordable price for X99
-
- Only three PCIe x16 slots
 - Just one M.2
 - Average onboard audio

VERDICT:

It might be a little cheaper than Gigabyte's GA-X99-Gaming G1 WiFi, but we'd highly recommend spending the \$60 extra for Gigabyte's class-leader.

7

ASRock Fatal1ty 990FX Killer

Aimed at the AMD set

PRICE \$199
www.asrock.com

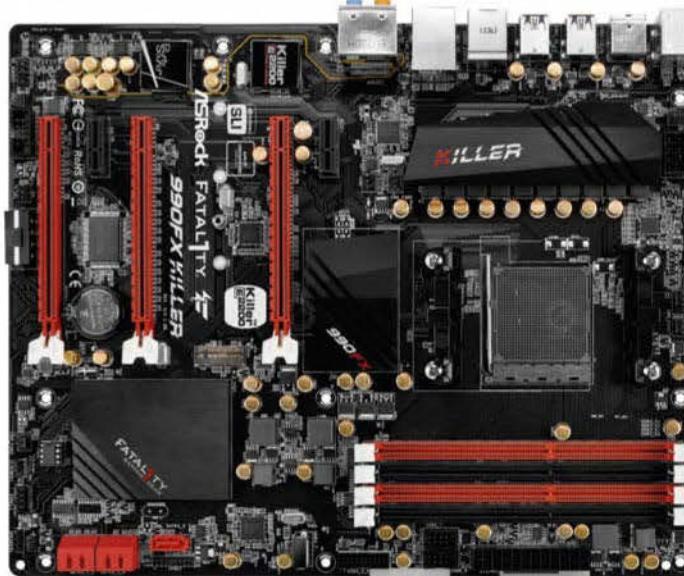
Sourcing an AMD motherboard is harder than finding a gamer who agreed with Steam's attempt to commercialise mods; after reaching out to the big four, we had to beg several times for them to include an AMD board. In fact, we got this ASRock board not from ASRock, but from AMD itself, who supplied it with one of its CPUs for testing.

As the name suggests, this board uses AMD's premium 990FX chipset, which enables overclocking and SLI support. While the specs claim this board supports quad-SLI, a cursory glance at the board itself reveals this to be impossible, as it only has three PCIe x16 slots, limiting the board to three cards.

A single M.2 socket is included, but it's only of the PCIe 2.0 x2 variety, so will be much slower than the cutting edge PCIe 3.0 x4 slots available elsewhere. The 8+2 phase power design is solid for

a board of this price, and when combined with the numerous overclocking options in the BIOS will help users extract the most out of their AMD CPU. For the price we're quite ok with the Purity Sound audio solution used within, which is based on the same Realtek ALC1150 chip used in ASRock's X99 board. However, only five SATA3 ports is a little lacking, even considering there's also a single SATAe port.

Overall this is a solid board, but when compared against the features offered on similarly priced Z97 boards is a little lacking, especially regarding M.2 and SATA support. *BENNETT RING PC*



- Solid power supply
 - Triple GPU support
 - Decent onboard audio
-
- Only five SATA 3 ports
 - Slow M.2 connection

VERDICT:

Despite the mid-range price, we feel this board is lacking a few of the standard features found on other \$200 products.

7

ASUS H97-Pro Gamer

A capable budget backbone

PRICE \$165
www.asus.com.au

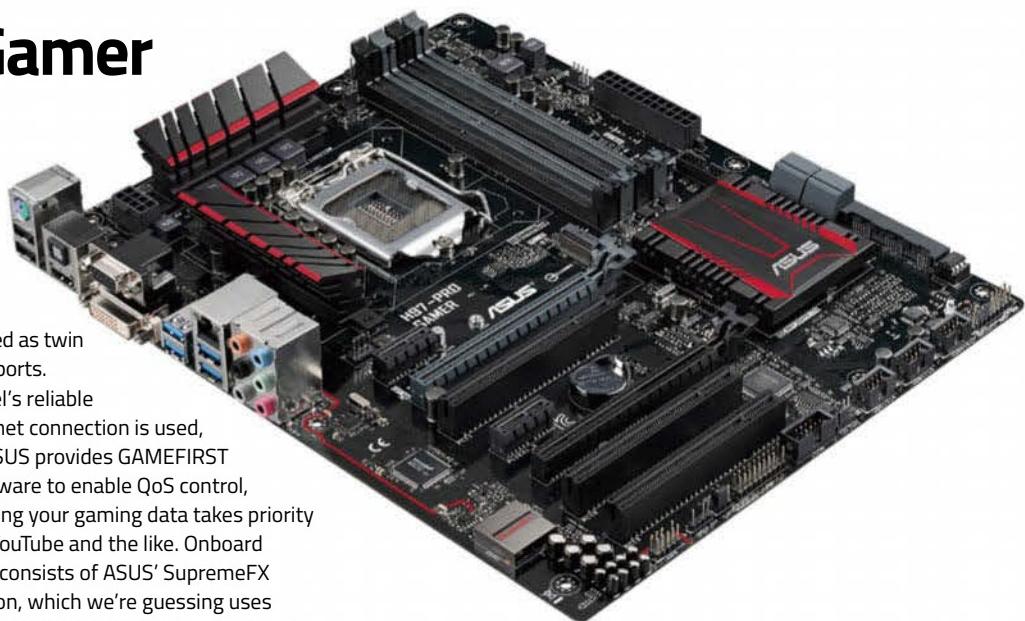
It mightn't be mentioned on the packaging, but ASUS has enabled overclocking of Intel's K-series CPUs on this H97-powered motherboard. This fact alone puts it at a bit of an advantage, but even if you weren't thinking of overclocking it delivers a very value-packed board for the price.

Twin PCIe 3.0 x16 slots are provided, yet it can only handle AMD's CrossFire (no SLI support here), but this probably isn't a great concern to those building a budget gaming rig. Interestingly ASUS has equipped the board with three legacy PCI slots, and another two PCIe x1; while this is great for owners of older PCI peripherals, we have to question whether it's worth sacrificing so many PCIe slots for them. The M.2 port is a welcome addition, but it's limited to PCIe 2.0 x 2 speeds, likely due to the lack of PCIe lanes on the H97 chipset. The four SATA3 ports supplied by H97 are supplemented by an extra SATAe port, which can also

be used as twin SATA ports.

Intel's reliable Ethernet connection is used, but ASUS provides GAMEFIRST II software to enable QoS control, ensuring your gaming data takes priority over YouTube and the like. Onboard audio consists of ASUS' SupremeFX solution, which we're guessing uses the same Realtek ALC115 codec found elsewhere, as it's rated to deliver an excellent signal to noise ratio of 115dB.

This board presents solid value for money, and the inclusion of overclocking makes it a bargain for tweakers, but we wish they'd trimmed back the number of PCI slots. It's also a little pricey compared to some of the entry-level H97 boards on offer. *BENNETT RING PC*



- Includes M.2 and SATAe
- Decent onboard audio
- Three PCI slots
-
- Three PCI slots
- A little expensive

VERDICT:

A great basis for a simple budget build, it's still a bit pricey compared to other H97 boards

8

ASUS Maximus VII Ranger

One of the best Z97 boards around

PRICE \$245
www.asus.com.au

Powered by Intel's premium Z97 chipset, the Maximus VII Ranger delivers an exceptional range of features at an excellent price point. In fact, it's one of our favourite Z97 board on the market, and here's why.

For starters, there's an excellent range of PCIe slots, with twin PCIe 3.0 x16, one PCIe 2.0 x4 and three PCIe 2.0 x1 slots up for grabs. This board can support both SLI and CrossFire, with up to three cards in place (the third will use the PCIe 2.0 x4 slot). Full overclocking support is also included, and we absolutely adore ASUS' beautiful UEFI BIOS, which spells everything out cleanly and clearly. ASUS doesn't advertise the power phase design of this board, which suggests it's not quite as impressive as competitors'. The inclusion of start, reboot and CMOS reset buttons on the board also help make overclocking a breeze, and it's compatible with the ASUS OC Panel.

We love the Keybot feature, which allows you to record macros for your keyboard, no matter the type, thanks to the dedicated Keybot microprocessor on the board. Once again Realtek's ALC1150 delivers the audio solution, but it's been improved with the use of ELNA capacitors. In reality it'll sound basically the same as other ALC1150 solutions.

Up to six USB 3.0 and seven USB 2.0 ports are included, provided you make use of the internal USB headers, while six SATA 3 ports are standard. Finally a single M.2 PCIe 2.0 x2 slot is included – if only it was a PCIe 3.0 x4 slot it'd be perfect. With an excellent feature set and brilliant overclocking abilities, this board is one of the best homes for your K-series CPU around. *BENNETT RING PC*



- Brilliant BIOS
- Lots of PCIe slots
- Plenty of USB ports
-
- Slow M.2 slot
- Only six SATA 3

VERDICT:

With excellent features and solid overclocking, this is a great basis for your K-series gaming rig, especially if you're running two or three GPUs.

9

Gigabyte H97M-Gaming 3

Small in size, big on features

PRICE \$135
www.gigabyte.com.au

This Micro-ATX motherboard from Gigabyte is priced just right for an affordable mini-SFF gaming rig, and has packed a surprisingly large number of features into its tiny dimensions. Based on the H97 chipset it obviously has a few limitations, but they're arguably irrelevant to SFF builders anyway. We doubt many HTPC builders want to overclock their CPU or install multiple GPUs, but the latter option is indeed possible if you stick with AMD. As an aside, it turns out this board can indeed overclock K-series CPUs, but you didn't hear that from us, as Intel is none too happy about mobo vendors enabling this.

That's because this tiny board still retains twin PCIe x16 slots (only one runs at full speed though, with the other limited to x4), along with twin PCIe 2.0 x1 slots. Unfortunately there's no M.2 connection though, which would

have been very handy in such a small system. Instead the board includes six SATA 3 ports, a generous amount for such a small platform.

Gigabyte once again relies on Realtek's ALC1150 codec for sound, but has equipped it with the company's proprietary AMP-UP technology. Basically this is an integrated rear amp combined with SoundBlaster software, yet it delivers the same 115dB SNR of all ALC1150 sound systems. No overclocking is supported, but Gigabyte has included Killer's E2200 gaming Ethernet. If only it had shipped Wi-Fi as well, which is pretty standard around this price point. This is a well-rounded board, but it'd be even better if Wi-Fi or M.2 came as standard. *BENNETT RING PC*



- Six SATA3 ports
 - Four PCIe slots
 - Solid onboard audio
-
- No M.2
 - No Wi-Fi

VERDICT:

This is a compelling Micro-ATX board from Gigabyte, but the lack of Wi-Fi is a shame given its popularity on HTPCs.

8

Gigabyte X99-Gaming 5

A mother of a board...

PRICE \$399
www.gigabyte.com.au

Now this is what we expect from an X99 board – check out the four full-length PCIe lanes, ready to swallow your quad-GPU setup. One of the biggest strengths of X99 is the number of PCIe lanes, so it's nice to see Gigabyte make full use of them.

Like the ASRock X99 board, Gigabyte has endowed its X99 beast with a single M.2 port, and it's only of the x2 variety. Another SATAe port is included, while a whopping ten SATA 3 ports deliver enough room to mirror all of Pirate Bay if you have enough spare drives. Up to eight USB 3.0 and another eight USB 2.0 ports are available, provided all of the internal headers are utilised.

Gigabyte is still the only company to use high-quality PowIRstage ICs for its power circuitry, yet it's only using a six stage power phase system. Helping to balance this out is the use of a quad-core SoundBlaster audio chipset,

combined with an upgradable amp that the user can swap out. It's one of the better onboard audio solutions we've tested. On the other hand, the reliance upon Killer's E2201 chip for LAN is a shame, as we prefer Intel's solution. We also love the use of a LED on the rear panel, making it super easy to see where you're plugging stuff in a darkened gaming den.

Throw in extensive overclocking options, and we have an X99 board that we firmly approve of. Now if only it had a CPU worth installing in it, we'd recommend upgrading from that boring old i7 you're running. *BENNETT RING PC*



- Quad-GPU support
 - SoundBlaster audio
 - Lots of SATA3 and USB ports
-
- Six-phase power
 - No Wi-Fi card included

VERDICT:

If you're paying the big bucks, you expect to get all the features, and this board delivers.

9

MSI H97 Gaming 3

One of the gang

PRICE \$155
au.msi.com

MSI has an excellent reputation when it comes to value for money, and the H97 Gaming 3 is its attempt at putting together an affordable option for Intel gamers. Being based on the H97 chipset it obviously doesn't support SLI, but that doesn't stop it from being a capable little home for your system. Like other H97 boards, we're pretty sure this one also supports K-series overclocking, but that's off the record ;)

It shares a very similar PCIe/PCI slot configuration to the ASUS board in this roundup, with twin PCIe x16 slots for graphics cards, twin PCIe x1 for smaller peripherals, and triple PCI slots for legacy products. Again we have to question if any users will make the most of these three PCI slots, especially as it's getting harder to find compatible drivers for old PCI devices. A single M.2 PCIe 2.0 x 2 connection is wedged between the PCIe slots, but no sign of a SATAe connector.

Six SATA3 ports are standard at this price point, while six USB 3.0 and six USB 2.0 ports are also par for the course (again, internal headers must be used to enable the entire USB suite). MSI's take on audio is known as Audio Boost 2, and no points awarded for guessing which audio codec it uses. Yep, Realtek's ALC1150 is here too. MSI's unique selling point is that it allows power to be supplied from the PSU to the audio solution, promising to help remove static in the process.

There's little to differentiate this board from the ASUS H97-Pro Gamer, apart from a slight \$10 price drop. Choosing which one you like will probably come down to brand loyalty. *BENNETT RING PC*



- M.2 and SATAe support
- Good BIOS
- Healthy range of features
-
- Three PCI slots

VERDICT:

Here comes another one, just like the other H97-powered one...

7

MSI Z97 Gaming 5

Z97 for less

PRICE \$189
au.msi.com

The Z97 chipset is intended for premium gaming and overclocking boards, but MSI has shown that it's possible to get the price down to almost H97 levels in the form of the Z97 Gaming 5. Considering it's only \$30 more expensive than some H97 boards, it represents tremendous value, but did MSI have to cut many corners to do so?

With full overclocking support delivered courtesy of the Z97 chipset, you probably won't find a cheaper platform to tweak your K-series CPU. It's also got full SLI support, delivered over the three PCIe 3.0 x16 slots. Another four PCIe x1 slots provide plenty of scope for adding extras, while six SATA3 ports deliver a decent amount of storage space. Killer's gaming solution has been used instead of Intel, no doubt to shave costs, while a single M.2 PCIe 2.0 x2 slot allows for high-speed drives... just not as high speed as the best M.2 drives can go.

Once again we see the ALC1150 tasked with audio duties, and it's equipped with the same Audio Boost 2 features of other MSI boards. A nice inclusion is the XSplit Broadcaster voucher for game streamers, but this software solution doesn't come close to NVIDIA's ShadowPlay. Finally, we should comment on MSI's revamped UEFI BIOS, which is one of the better ones on the market, albeit not quite as nice as our favourite ASUS interface.

MSI has delivered one of the cheapest Z97 boards on the market, yet it appears they've barely trimmed any fat off the bone. As a result, this is a fine buy indeed. *BENNETT RING PC*



- So cheap for Z97
- Fully featured
- Lots of PCIe slots
-
- Slow M.2 slot

VERDICT:

This board is outstanding value, offering all of the features of Z97 boards that cost \$60 or more.

9

The Sound of Silence.

Thermaltake Suppressor F51



Meet the Suppressor F51 – our first silent chassis from Thermaltake. The Suppressor F51 is expertly machined from the ground up to provide cutting-edge uniform sound reduction. We've embedded custom sound dampening panels that minimise noise output whilst your system is in operation. Our renowned modular design framework provides the perfect balance between silence and performance – and unlocks an effortless and straightforward hardware installation process no matter how demanding your build is.

Build without limitations with full support for extreme liquid cooling solutions thanks to our award winning Tt LCS Certification. With full support for high-end multi-GPU setups and motherboards sizing from Mini ITX through to E-ATX.

The Suppressor F51 was tested within a semi-an-echoic chamber for acoustic sound-proofing, vibration levels and sound-absorption. On average, the Suppressor F51 performs over 17dBA quieter than models without our custom fitted sound-dampening foams – making it one of the quietest cases available today.

Thermaltake Suppressor F51
Available Now for AU\$159

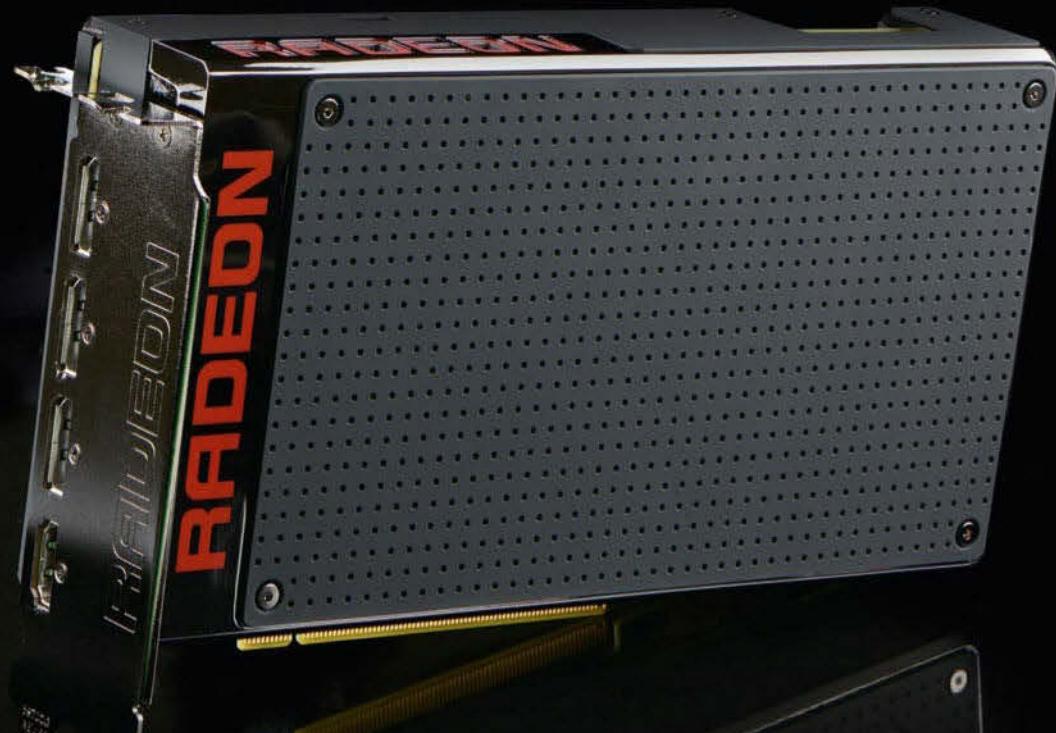
To Learn More Visit >>
www.thermaltake.com.au


Thermaltake

AMD Radeon R9 Fury X

Small on size, big on performance

PRICE \$979
www.amd.com



The Fury X is the first release in a range of high-end graphics cards all based around the Fiji chip, debuting in Australia on June 25, and it's going to be the most expensive. With an Aussie recommended price of \$979, this water-cooled speed demon is AMD's new flagship graphics card. Soon after its launch will come Fury, an air-cooled version of the product at a lower price. AMD wouldn't reveal any other changes to the Fury, but we expect fewer Stream Processors and/or a lower clock speed. If it's anything like other product releases, expect a sizeable price drop yet most of the Fury X performance in the new Fury, which is probably why AMD isn't releasing any info on it, for fear of eating into Fury X sales.

Finally there's the R9 Nano, which is just six inches long, making it the perfect product for tiny Mini-ITX cases. With a TDP of just 175W, AMD claims it is the most power efficient high-end GPU on the market. It was this card that AMD showed off in its new Project Quantum miniature gaming PC, which measures just ten inches across, and which AMD expects will release sometime next year. While both cards sound interesting, we're here to talk about the Fury X, so let's get on with it.

THE MEMORY MASTER

The first thing you'll notice when looking at the Fury X is how damn small it is, measuring just 19.4 centimetres long, and 30 percent shorter than previous full-sized graphics cards. The reason behind this is the revolutionary new High Bandwidth Memory (HBM) featured on this product, which replaces the GDDR5 memory used until now. Past GPUs had their memory modules mounted on the Printed Circuit Board that makes up the bulk of a modern graphics card, and they needed plenty of space to fit them all. In stark contrast, the memory modules used by the Fiji processor are actually built into the GPU, and they're a fraction of the size of normal memory modules. Looking at the close-up photo of the GPU, the memory sections are the four small squares on the outer ring. Unlike traditional GDDR5 memory, the HBM memory actually runs at a slower clockspeed, but over an incredibly wide bus. AMD's Radeon R9 290X used a 512-bit bus running 5GHz GDDR5 memory, delivering an industry-leading 320GB/sec of bandwidth. Compare this to the HBM memory used on Fury, which only runs at 500MHz DDR, but over a huge 4096-bit bus. This delivers an incredible 512GB/sec of

bandwidth, 60% faster than the R9 290X and the most memory bandwidth ever seen on a consumer graphics card.

This gives the Fury X plenty of memory bandwidth for high-resolution displays, and AMD is pushing this as a 4K product, but there's one major issue. Despite AMD pushing the marketing message over the last few years that higher resolutions require more onboard memory, the Fury X only ships with 4GB of HBM memory. It's a huge backflip for AMD, especially when the company is promoting the 8GB of memory found on its R9 390X product. 4GB is a rather small amount when we're talking about 4K gaming, with many current games needing more than that when run at 4K resolution and high-detail settings.

This means that Fury X potentially faces major performance issues when playing 4K games. If it needs to fetch memory from the PC's RAM once its onboard memory is filled, performance will plummet as the bandwidth to the PC's system memory is a fraction of that compared to the GPU's onboard memory. To test this out for ourselves, we ran GTAV in 4K mode, first with nearly every setting maxed, which requires a whopping 5382MB of video memory. Then we lowered texture



detail and population variety, which drops the onboard memory required to 4045MB, without causing any other performance differences. As expected, when the Fury X had to fetch data from the system memory the performance plummeted, with a minimum framerate of just 2.4fps. When the card didn't need to access system memory the minimum framerate was much healthier, at 15.5fps, showing just how bad performance becomes when the graphics card runs out of memory. This is a big blow to AMD's claims about Fury X being ready for 4K gaming.

While the memory is the most revolutionary aspect of the Fury X, the Fiji GPU is a monster in its own right. It's the most complex GPU AMD has ever built, with nine billion transistors filling the 596 square millimeter die. Inside the GPU are 64 Compute Units, delivering a total of 4096 Stream Processors and 256 Texture Units. That's a huge increase over the R9 290X, which had 2816 Stream Processors and 176 Texture Units. It's built on the existing 28nm process, which probably explains why the card has a TDP of 275W, and it's fed via twin 8-pin power connectors. That's identical to the TDP of its new R9 390X but, likely due to the small

size of the card, AMD has equipped the Fury X with an All-in-One water cooler. AMD claims the new cooler outputs less than 32dB of fan noise, but during our testing we found it to be louder, topping out at 45dB. However, it does keep the GPU very cool, with the maximum temperature we measured at 50C under load.

THE SOFTWARE SIDE

As far as new features that the user can make the most of, the Fury X comes with the usual Radeon suite of goodies. CrossFire is supported for up to four Fury X graphics cards, while FreeSync is also on the box. It's fully DirectX 12 compliant, but the one new feature we dig is basically AMD's version of Dynamic Super Resolution. AMD calls it Virtual Super Resolution instead, but it does the exact same job which used to be known as downsampling, allowing the user to set games to render at resolutions higher than those supported by their display, clearing up jaggies in the process. For those of you who have had to jump through the hoops necessary to get DownSampling working manually in the past, having a simple drop down option in the Catalyst Control Centre will be a welcome addition.

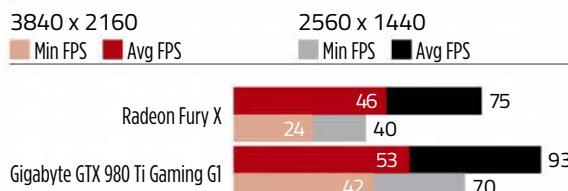
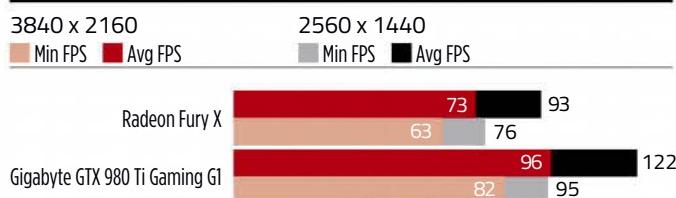
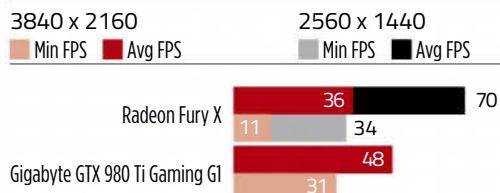
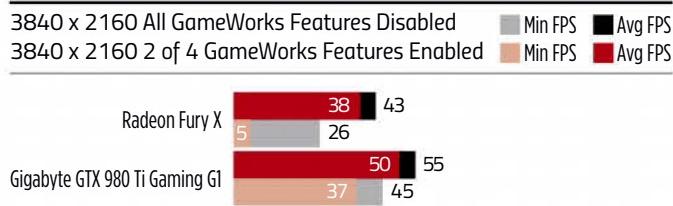
PERFORMANCE

We only had one day to test the Fury X, but threw as many benchmarks as possible at it. Our testbench was the ASUS Maximus VII Ranger with an Intel i7-4790K CPU, along with 8GB of Kingston HyperX memory. Corsair's new RM850i PSU delivered the juice, while a SanDisk Ultra II handled storage duties. Gigabyte's brilliant GTX 980 Ti Gaming G1 card was used to represent AMD's mortal enemy, NVIDIA. We should note that this card runs around 10% faster than stock a GTX 980 Ti, yet only costs around \$60 more than a standard GTX 980 Ti, at \$1099. AMD's 15.15 Catalyst drivers were used for AMD, while NVIDIA's 353.30 drivers were used for the GeForce.

While the Fury X didn't have the lead in any of our benchmarks, it came very close in two of them, being FireStrike Ultra (4K) and Shadow of Mordor (4K). Here it performed within 15% of the GeForce card; remove the Gigabyte's 10% headway resulting from its factory overclock and the Fury X is basically neck and neck with a stock GTX 980 Ti. Unfortunately the Fury X didn't perform quite so well in the remainder of our tests. NVIDIA had a 30% lead in Grid Autosport, with another 33% lead in

Wherefore art though, HDMI 2.0?

For whatever reason, AMD has chosen not to endow the Fury X with a HDMI 2.0 output. Considering they're pitching this as a 4K product, and how its small size makes it a ripper for lounge room rigs, we're confounded by this decision. When we asked AMD about the lack of HDMI 2.0, their response was that they're working with partners to develop a DisplayPort to HDMI 2.0 adaptor... which is something, better than nothing... I guess.

3DMARK Firestrike Ultra (3840 x 2160)**SHADOW OF MORDOR** Ultra Detail**GRID AUTOSPORT** Ultra Detail**METRO 2033** Very High Detail SSAA off**BATMAN ARKHAM KNIGHT** Ultra

Metro 2033 at 4K (strangely our 980 Ti refused to run Metro 2033 in 2560 x 1440 mode). GTA V saw the GeForce with a 22% lead at 4K, while the new Batman game gave the GeForce a 27% lead at 4K res, and that was with all GameWorks features disabled.

We sadly didn't have time to overclock our Fury X, but despite the losses to the GTX 980 Ti in our benchmarks we're still very impressed by Fury X. It's not quite the GeForce killer AMD claims it to be, but it comes damn close, especially once we remove our 980 Ti's Factory overclock. With an RRP of \$979 we can

expect the street price of Fury X to be even lower, which will make it extremely competitive with NVIDIA's flagship card.

However, we have two major concerns with Fury X, the first being AMD's driver support. To be frank, the company has dropped the ball of late, with the last WHQL release in December of 2015, which simply isn't good enough. Hopefully now that it has a capable bit of hardware in-hand it can focus on improving the driver support, which could lead to substantial performance gains for the Fury X. Of greater concern though is the 4GB

3DMARK Firestrike Extreme (2560 x 1440)**GRAND THEFT AUTO TORTURE TEST**

Everything maxed except: MSAA x4; Reflection MSAA: x2; Grass Quality: Very High; Soft Shadows: Softest; Motion Blur 0; Frame Scaling Disabled.

Memory used: 5382GB

3840 x 2160

Min FPS Avg FPS



Fan Noise

dBs (lower is better)

**GRAND THEFT AUTO TORTURE TEST**

with sub 4GB memory usage. Same as Torture Test but Population Variety set to minimum, and Texture Quality set to normal

Memory used: 4045MB

3840 x 2160

Min FPS Avg FPS



memory limit, which is a real issue when 4K gaming. There's nothing AMD can do about this other than release a product with 8GB of HBM memory, and until then this lack of memory puts paid to any claims about Fury X being a true 4K gaming solution. **BENNETT RING PC**

- Excellent performance
- Whisper-quiet cooler
- Extremely small form factor

- Not quite as fast as a GTX 980 Ti
- Only 4GB of memory
- Poor driver support

VERDICT:

With better driver support and aggressive pricing hopefully AMD can deliver a product that is truly competitive with NVIDIA's flagship.

9

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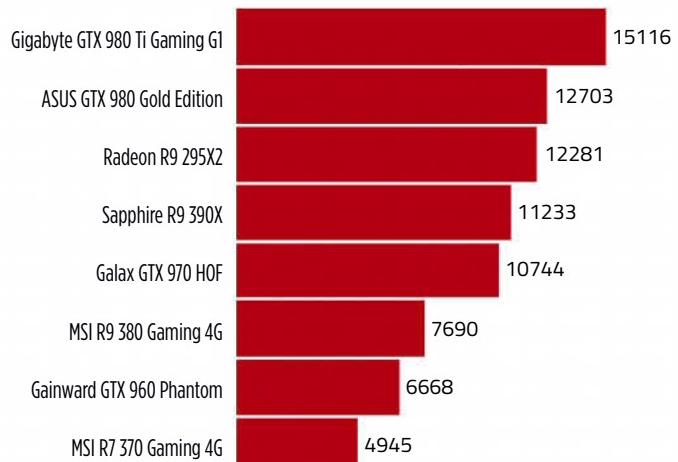
BENNETT RING has the power!

AMD and NVIDIA might be behind today's gaming graphics cards, but it's extremely rare for them to sell full-blown graphics cards to consumers. Instead they're the folks who create the Graphics Processing Unit, or GPU, that lies at the heart of your graphics card. Their teams of engineers create the design of the GPU, and then farms it out to microprocessor fabricators to build the chips, with Taiwan Semiconductor Manufacturing Company Limited currently used by both the Red and Green teams.

So AMD and NVIDIA design the GPUs, as well as the basic Printed Circuit Board (PCB) and cooler design they're going to

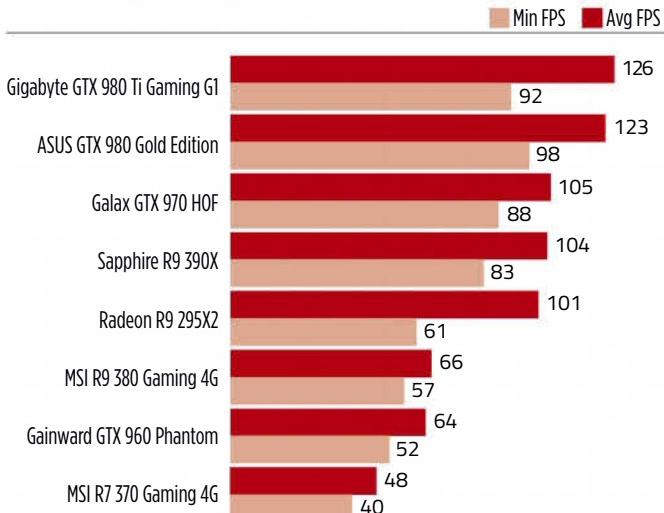
be hosted on, which is called the "reference" design. The GPUs are then manufactured by TSMC, and then it's the turn of the third party manufacturers to make these into actual products. Gigabyte, MSI, ASUS, eVGA, Galax, Sapphire and many more buy these GPUs in bulk, and build graphics cards based around these products. However, they have two choices when doing so; either stick with the reference design for the PCB and cooler, or come up with their own. The former option is usually cheaper and faster, while the latter allows them to introduce other features such as better overclocking or different output options.

3DMARK Firestrike Score



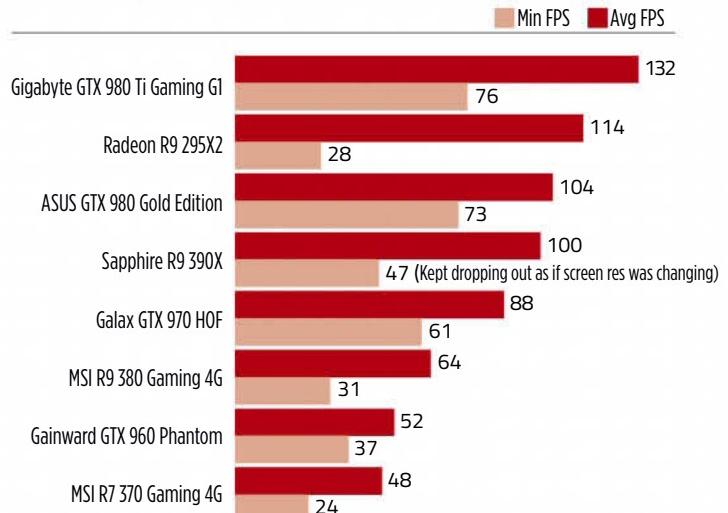
GRID AUTOSPORT Benchmarks

2560 x 1440, 4xMSAA, Ultra Detail



SHADOW OF MORDOR

2560 x 1440, 4xMSAA, Ultra Detail



ASUS GTX 980 20th Anniversary Gold Edition

Always believe in your soul

PRICE \$1069
www.asus.com.au

Paying over a grand for a graphics card based on the GeForce GTX 980 is a very, very hard sell now that the GTX 980 Ti has been released. It made perfect sense when this product was first released, as ASUS has delivered the best darned GTX 980 on the planet, with performance that left other GTX 980s eating its dust, but it's now facing off against a more powerful GPU that sells for the same price. Can the changes ASUS has made to the GTX 980 make it competitive with the Ti version of the same GPU?

ASUS has equipped this card with 14-phase power, enabling incredible overclocking capacity. It's also got a defroster feature for LN2 overclockers, along with a clear BIOS button in case it's overclocked so far it won't boot. It's also decked out the entire card with a shiny gold colour scheme, from the twin fan cooler to the gold back plate that stiffens the PCB. The cooler uses

ASUS' DirectCU II heatpipe design, and is equipped with a 0dB fan. This means that the fans only spin up when the GPU hits a certain temperature; neither fan will move when it's just doing 2D desktop duties.

Thanks to the changes made to the card, ASUS has increased the base clock from the default speed of 1126MHz up to 1317MHz. More importantly, the Boost speed (which is the speed used when the card is under maximum load while gaming), has increased from the default speed of 1216MHz up to 1431MHz, a very tasty 18% increase. Unfortunately that's still not enough to catapult it past the speed of the GTX 980 Ti, which can be had for the same



price. If ASUS can drop the price by a couple of hundred bucks this would be an absolute winner, but it's since been superseded by NVIDIA's latest and greatest. *BENNETT RING PC*

- Sexy gold design
 - Excellent for overclockers
 - Fastest GTX 980 around
-
- Very expensive
 - Slower than the GTX 980 Ti

VERDICT:

Unless you're planning on setting world record overclocks, this card simply can't keep up with the more affordable GTX 980 Ti

7

Gainward GTX 960 Phantom

The sweet sound of silence

PRICE \$299
www.gainward.com

It might house one of the slower GPUs in our roundup, but that doesn't stop this card from being an absolute behemoth. Looking like a portable refrigerator, the GTX 960 Phantom has one of the most unique cooler designs we've seen; unlike other coolers that mount the fans on top of the cooling fins, Gainward has instead tucked the fans away inside the cooling fins. It seems to do a damn fine job, as this card posted one of the lowest fan noise results in the roundup, but that could also have something to do with the relatively cool GPU running within. With a TDP of just 120W, the GTX 960 GPU is easily the coolest chip in our roundup.

Thankfully Gainward has made the twin fans within the cooling block removable, so they're easy to slide out and clean when the dust devil deposits his load inside. The large cooler seems to have facilitated a slight factory overclock, with the base speed

increased 7% to 1203MHz, while the Boost speed gets upped by the same amount to 1266MHz. NVIDIA didn't release a reference design for this card, leaving Gainward to decide on its outputs, settling on single DisplayPort, HDMI, DVI-I and DVID-D outputs.

When we look at the price vs performance of this card, we think it's probably the best budget performer of the pack, though AMD's R9 380 comes close. However, NVIDIA's better driver support and lengthier feature list gives the GTX 960 the push and a shove it needs to come in first. *BENNETT RING PC*



- Extremely quiet
 - Very affordable
 - Decent 1080p performance
-
- Rather large cooler
 - \$30 more than cheapest GTX 960s

VERDICT:

This budget offering delivers solid 1080p performance, while remaining whisper quite in the process.

8

Galax GTX 970 Hall of Fame (HOF)

Over-engineered to the hilt

PRICE \$589
www.galaxstore.net

This is one very expensive GTX 970 when compared to the cheaper versions produced by the likes of Gainward. Heck, even Galaxy has a cheaper version which goes for just \$449. So why has the same company released another version of the same GPU for a whopping 31% extra? It's all about the overclocking baby...

This has to be one of the most striking graphics cards we've seen of late. The stunning white design of the cooler sits over the custom-designed PCB, which is equipped with an 8+2 phase power system. Twin 80mm fans sit either side of a single 90mm fan, delivering plenty of airflow to keep the GPU cool. A myriad of features are aimed at serious overclockers, from the ten-layer PCB to the premium Digital PWM controllers to the claimed Aerospace-grade power inductors. There's even a voltage modding tool released by the community to get around the strict power limits

NVIDIA imposes on its products.

A large button on the mounting plate enables HyperBoost, which ramps the fan up to an incredibly loud 68dB, while also increasing voltage. Even without HyperBoost enabled, Galax has increased the GPU speed considerably. The base speed jumps 17% to 1228MHz, while the Boost speed increases by 17% to 1380MHz, making it the fastest GTX 970 on the market.

At these speeds it handily beat AMD's new R9 390X in our game benchmarks, a product which costs \$100 more. If you're after better value for money, cheaper GTX 970 products should be almost as fast as the HOF, but if you want the best 970 on the market, this is the one to buy, especially if you're into extreme overclocking. *BENNETT RING PC*



- Crazily overbuilt
- Superb overclocker
- Beautiful design

- Very expensive
- HyperBoost fan noise is obnoxious

VERDICT:

While there are better value GTX 970s out there, this version has the potential for record-breaking overclocks.

8

Gigabyte GTX 980 Ti Gaming G1

The cream of the crop

PRICE \$1099
www.gigabyte.com.au

Pity the poor Titan X owners. No sooner had they spent \$1500 on their imposing new benchmark-slayer than NVIDIA released the affordable version of the same GPU in the GTX 980 Ti. This is for all intents and purposes a Titan X with less onboard memory, with just 6GB of GDDR5 compared to the Titan X's 12GB.

At the heart of the GTX 980 Ti is the same GM200 GPU found in Titan X, but it's had a slight trimming. The total number of CUDA cores drops from 3072 to 2816, while the Texture Units also drops, from 192 to 176. Yet in every other area it's basically identical, including the 1000MHz base speed and 1075MHz Boost Speed. Gigabyte has gone one better though, increasing the base speed by a whopping 19% to 1190MHz, while the Boost speed has increased by a similarly impressive 20%, up to 1291MHz. This is only when the card is in OC mode though, which brings a slightly increased fan noise with it. We

tested the card in game mode, where the Boost speed only increases to 1241MHz, which is still very impressive.

Gigabyte has been able to overclock it so highly thanks to a combination of the 980 Ti's general excellent overclocking ability, as well as the new Windforce 3X 600W cooler. This triple fan cooler mightn't look to good, but with a fan noise of just 48dB it's a ripper.

With top-tier performance the GTX 980 Ti only has one competitor worth talking about – AMD's new Fury X GPU. But you'll have to read the exclusive review of that elsewhere in this issue to see whether NVIDIA or AMD hold the title of fastest single-GPU card on the planet. *BENNETT RING PC*



- Blistering performance
- Excellent cooler
- Big factory overclock

- Very expensive
- Rather ugly cooler design

VERDICT:

If you want cutting-edge performance in a cool, quiet package, Gigabyte's take on the GTX 980 Ti is hard to resist.

9

MSI R7 370 Gaming 4G

An oldie but a goodie

PRICE \$269
au.msi.com

Welcome to AMD's latest budget graphics card, the R7 370. It might sound like a new product thanks to the flashy new title, but in reality it's actually a rebadged version of an older graphics card that was a rebadged version of an older graphics card!

The Pitcairn processor used in this product was originally released as the Radeon HD 7850, and then re-released as the R9 265, with a few minor adjustments along the way. It now has 1280 Stream Processors compared to the prior two products' 1024, while the Texture Units have also slightly increased, from 64 up to 80. It comes with just 2GB of onboard GDDR5 memory over a 256-bit memory bus, while the GPU itself is stuck using AMD's old GCN 1.0 design. This means it doesn't support hardware video acceleration over 1080p, nor AMD's FreeSync technology.

The default base speed of this card is 900MHz, but MSI has increased it to 1020MHz in OC mode, while the Boost clock increases from the default of 925MHz up to 1070MHz. Don't expect to get much more out of it, as this old GPU design has been pushed pretty far already. The one benefit of using such an old GPU design is that it's got a low TDP, and when combined with MSI's excellent cooler delivered the quietest experience of all of our graphics cards.

Unfortunately the performance simply isn't up to snuff considering the price. At just \$30 more the Gainward GTX 960 offers a much better budget buy. *BENNETT RING PC*



- Very quiet
 - Cheap price
-
- Resoundingly beat by the GTX 960

VERDICT:

This rehash of a rehash is beginning to show its age, giving the GTX 960 our nod for best sub-\$300 graphics card

6

MSI R9 380 Gaming 4G

More rebranding shenanigans

PRICE \$349
au.msi.com

Like all of the cards in AMD's new R9 300 series, the R9 380 is actually a rebadged variant of an earlier product. In this case it's the R9 285, as it uses the same Tonga-design GPU within. Thankfully this is a newer GPU design than the one found in the R7 370, as it's built upon the GCN 1.2 architecture. All of AMD's flagship GPU features are supported by this design, so there's no fear that you'll miss out on FreeSync, full DX12 compatibility or hardware accelerated video above 1080p.

Looking at the specs, it appears that the R9 380's GPU is absolutely identical to the R9 285, with one small exception. Likely as a result of maturing processor manufacturing, AMD has been able to increase the base and Boost speeds of the GPU, with a Boost speed of 970MHz in the newer product (up from 918MHz in the original). MSI has eked out just 30MHz more in its

version of the product, with the GPU running at 1000MHz in Boost mode, provided you set the MSI software to OC mode (which we did for all of our benchmarks). 4GB of onboard GDDR5 memory makes this a suitable candidate for 1080p gaming.

This card beat the GTX 960 in two of our tests, by an average of around 17%. However, it also lost to it in one test, but only just. Considering it costs 16% more than the GTX 960, choosing a clear winner between the two isn't easy. However, we're going to give NVIDIA's GTX 960 the nod due to its superior driver support (we had many issues with AMD's drivers) and added features. *BENNETT RING PC*



- Solid 1080p performance
 - Low fan noise
 - Good value
-
- No new features compared to R9 285

VERDICT:

Offering neck and neck price and performance compared to the GTX 960, AMD's poor driver support holds this back from being the clear value winner.

8

Radeon R9 295X2

Two heads are better than one

PRICE \$1189
www.amd.com

This is one of the very few graphics cards that AMD actually sells to consumers, and there's good reason for it. Tucked away beneath that imposing cooler are not one but two GPUs, each of the R9 290X variety. These are potent processors in their own right, each pumping out 250W of TDP, which is why AMD has had to mount a custom All-in-One water cooler to this card, which is enhanced further by an air cooler mounted in the middle of the heatsink.

With another fan spinning on the external radiator, it's no surprise that this card clocked the loudest in our sound test, measuring at a very noticeable 55dB. This was outside of a case on an open testbench, so we'd guess it gets even louder in a cramped PC case.

The card might have 8GB of onboard memory, but games can only make use of 4GB, as it's split down the middle to serve each of the GPUs. This also means the card requires CrossFire support to



live up to its full potential, yet we've seen time and time again that AMD takes its sweet time to release updated CrossFire drivers that support new games. Unfortunately this card didn't do well in our benchmarks, as it's designed for much higher resolutions; even our 2560 x 1440 test wasn't enough. For shits and giggles we ran this card at 4K in the Shadow of Mordor test, where it scored an average FPS of 59. Very tasty.

When it comes to ultimate bang for buck, this card has the potential to run rings around the GTX 980 Ti, but AMD

really needs to lift its game in the driver department for us to give a CrossFire solution the thumbs up. Considering it hasn't released a WHQL certified driver since 2014, AMD obviously has a lot of work to do. **BENNETT RING PC**

- Supreme 4K performance
- Very cool design

-
- Loud
- Relies on updated CrossFire drivers to flourish

VERDICT:

If you're running 4K this beast offers excellent value, provided AMD has released the relevant CrossFire drivers for your favourite game.

8

Sapphire Tri-X R9 390X

A beefed up R9 290X

PRICE \$689
www.sapphiretech.com

The R9 390X is the top of the line in AMD's new 300 series, and it's yet another rebadged product from last year. However, this time AMD has actually made a meaningful change to the product, which should help it outperform its successor.

This card is based on the same GPU as that found in the R9 290X, but AMD has increased the memory bandwidth. Instead of using 1350MHz GDDR5, it has endowed the R9 390X with 1525MHz GDDR5, giving it an effective memory speed of 6Gbps. This is a large 20% increase over the 5Gbps found on the R9 290X, which should come into play at higher resolutions. It's also doubled the amount of onboard memory up to a staggering 8GB, more than enough for 4K resolution. Indeed, AMD is pushing the R9 390X as 4K-ready, but that's a rather laughable suggestion given a GTX 980 Ti can't even deliver playable 4K performance, and the R9 390X just doesn't have the 4K



performance to justify all that memory.

Sapphire has given its R9 390X quite possibly the smallest factory overclock we've ever seen, with the Boost speed increasing a mere 5MHz to 1055MHz. At this speed we see the R9 390X measuring considerably slower performance than the GTX 980. We should highlight that it's possible to purchase a basic GTX 980 for the same price as this R9 390X, with Gainward's GTX 980 starting at \$699, and the R9 390X simply isn't in the same league. **BENNETT RING PC**

- FreeSync support

-
- Noisy fan
- Expensive
- Slower than a GTX 980

VERDICT:

Despite the faster memory bus, we'd highly recommend buying a cheap GTX 980 over AMD's flagship 300 series card.

7



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A-SERIES

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DISPLAY DANCE-OFF

Until VR takes off, we're stuck staring at a computer display to visually interact with our games' delicious graphics. Unlike consoles, PC gamers have a huge range of choices to make when it comes to the display – what size, resolution and features should you look for? And how much dare you pay? We've sourced four killer displays that all answer these questions very differently. BENNETT RING

Philips BDM4065UC

4K over 40 glorious inches

PRICE \$999
www.philips.com.au

Sometimes size does count, and nowhere is that more apparent than PC gaming displays. The bigger the screen, the more immersive the experience. Well, that's the gist of it, but many big screen displays lack the crisp resolution necessary to deliver a crystal clear experience. And those with ridiculously high numbers of pixels are often priced accordingly. Which is why this whopper from Philips is such a steal – not only is it massive, it's also got the pixels to back up its size, all with a price point that won't send your wallet running.

This is a true 4K display, packing in 3840 x 2160 pixels. Here at PC PowerPlay we've been very hesitant to jump aboard the 4K hype train, as it usually arrives on displays that are just 27 inches across. The result is a screen that packs too many pixels, as it's nigh on impossible to spot the difference between 4K and 2560 x 1440 at this size, yet you'll need a couple of GPUs to handle the higher resolution. There's also the issue of Windows' screwy scaling; while some icons and fonts look fine when scaled up, many applications don't have that ability, making 4K almost unusable for desktop duties on a 27" panel. There's no such problem with this 40 inch whopper, with icons and font perfectly readable. Pixel structure is also invisible even at the closest ranges, and the overall image is as sharp as it is huge.

The panel used within is neither IPS nor TN; instead Philips has gone with



a VA (Vertical Alignment) panel, which offers a compromise between the two. Viewing angles are good, which is an absolute must when sitting close to such a huge screen, as otherwise the edges would look distorted. Colour and contrast performance is also strong, albeit not quite in the same league as the IPS panel used in the ASUS display. If there's one issue, it's the slightly higher pixel response time, which Philips claims is 8.5ms. Thankfully this can be lowered considerably down to 3ms when enabling the Smart Response feature, and doing so doesn't affect the image quality too badly.

The other issue is the absolutely horrible stand. There's no height, tilt or swivel adjustment, so you're going to have to fudge up a shelf or something

similar to get it to sit at the ideal height for your gaming den.

Despite these niggles, there's no denying that a 40" 4K panel at this price is an absolute steal. It might not have G-Sync, FreeSync or 144Hz refresh rates, but what it does have is an absolutely retina-stretching size. Just bear in mind that to run it at its native resolution will require some seriously powerful hardware. BENNETT RING PC

- Huge
- Crisp 4K resolution
- Good colour and contrast

-
- Terrible stand
- Slightly slower pixel response

VERDICT:

If you want a massive display that is as crisp as it is colourful, this behemoth is damn good value.

9

AOC G2460PG

G-Sync for less than a grand

PRICE \$565
www.aocmonitorap.com/v2015/au



NVIDIA's G-Sync technology really needs to be seen to be appreciated, but it's taking a lot longer to reach affordable pricing than NVIDIA promised. The issue is the proprietary scaler that must be included in each G-Sync display, which bumps up the price by at least \$100. With most prospective buyers having never seen G-Sync in action, paying extra for a bullet-point on the box is hard to justify. Thankfully we're slowly seeing prices drop though, and this display from AOC is one of them. While it costs a little more than most 24 inch gaming displays, the price difference isn't massive, and the benefit of G-Sync makes the extra cost easy to justify.

The 24 inch panel used within has a native resolution of 1920 x 1080, which is fine for a screen of these dimensions, as pixel structure is basically invisible even at close range. It's a rip-roarin' 144Hz display, which makes it noteworthy even if it didn't include G-Sync, as this also allows it to work flawlessly with NVIDIA's 3D Vision kit. With a pixel response time of just 1ms it's no surprise to see that this is a TN panel, which also means it doesn't have the widest viewing angles around.

That's not an issue for such a small screen though.

This screen also features a technology called Ultra Low Motion Blur, or ULMB for short. This is a sequel to the LightBoost feature found on older NVIDIA-compatible displays, and can be used to minimise motion blur even more. However, it's not compatible with G-Sync, which means most gamers probably won't ever use it.

The plastic bezel has a slick brushed metal appearance, and the green line across the bottom hints at its special NVIDIA features. An anti-glare covering stops the screen acting as a mirror, while the On Screen Display (OSD) is controlled by a series of buttons on the bottom right of the face, and we found these very confusing to use. It's also very simplistic, with limited adjustments. The stand is simple but adequate, with both height and tilt control. Where this display fails is its range of inputs, with one meagre DisplayPort input. There's also a USB input, which drives two outputs, but they're both on the back of the display, making them hard to reach.

Out of the box we found the brightness was cranked through the

roof; lowering this to 60 delivered a much more palatable image. Overall contrast performance wasn't great, but colour reproduction was excellent, especially after we'd run a basic calibration routine and adjusted via the RGB controls. There wasn't a hint of motion blur during our gaming tests, and enabling G-Sync delivered the brilliantly smooth motion we've come to expect from NVIDIA's technology.

Best of all, it'll work all the way through

this monitor's supported refresh rates,

up to 144Hz.

When compared to the cost of other premium 24" 144Hz gaming displays, the AOC G2460PG isn't as expensive as it might seem. Throw in G-Sync support and it's a bargain. *BENNETT RING PC*

- Excellent colour reproduction
- No motion blur
- G-Sync rocks
-
- Average contrast performance
- Needs calibration

VERDICT:

It might cost around \$100 more than other premium 144Hz gaming displays, but the inclusion of G-Sync makes it worth it.

9

BenQ XL2730Z

27 inches of FreeSync glory

PRICE \$799
www.benq.com.au



It took a while to arrive, but AMD's answer to G-Sync has finally hit our shores. Cheekily titled FreeSync, it's actually not owned by AMD. Instead AMD did what NVIDIA could, and probably should, have done – it went straight to VESA, the folks who create display standards, and made FreeSync a part of the official DisplayPort standard.

This is why BenQ doesn't advertise the XL2730Z as having FreeSync. Instead, it uses the term "VESA Standard Adaptive-Sync", which is what the new FreeSync standard is officially known as. VESA added Adaptive-Sync to the DisplayPort 1.2a standard, which means it's open for any display makers to utilise. More specifically, it's the creators of display scalers who will leverage the new standard, which should make it much cheaper to create compatible displays. We say should, because the new standard is still very new, and apparently requires higher quality components to operate. However, as more displays are made with Adaptive Sync, expect the price of these displays to hit the same as non-Adaptive Sync screens.

While Adaptive-Sync has most of the same benefits as G-Sync, it has

one issue – it only operates within the refresh rate specified by the display maker. In the case of the BenQ XL2730Z, this bottoms out at 40Hz, whereas G-Sync works all the way down to 1Hz. Given that one of the big benefits of both technologies is the ability to play games at sub-60fps framerates yet still have smooth motion, and this is a bit of a bummer. However, 40Hz is around the limit where both technologies still look smooth; any lower than that and the motion blur becomes noticeable.

Now that we've got that out of the way, let's look at this Adaptive Sync display in more detail. It's a large 27 inch TN panel, with a native resolution of 2560 x 1440. Like all of BenQ's premium gaming displays it has a 144Hz refresh rate, and Adaptive Sync allows gamers to play anywhere between 40Hz and 144Hz without any stuttering or judder. It also has BenQ's Motion Blur Reduction technology, and it works like a treat without killing the brightness of the display, unlike other blur reduction techniques.

As usual we love BenQ's slick bezel and stand, which is highly adjustable, and it even has a hook for your headphones. The OSD is to die

for, allowing the user to save profiles which can then be loaded depending on the game being played. Plenty of input options are included, in the form of HDMI 1.4, HDMI 2.0, D-Sub, DVI-DL, and Display Port 1.2. Twin USB outputs adorn one side of the bezel. Image quality was above average, with rich blacks, crisp whites and excellent colour and contrast performance. However, when viewed next to the new ASUS display, the weakness of the TN panel is noticeable; it simply doesn't look quite as vivid or colourful as the IPS display.

\$800 is certainly a premium to pay for a display, but it's worth remembering this is a 27 incher with 2560 x 1440 resolution, whisking away at 144Hz. Add Adaptive-Sync and some of the best blur reduction we've seen, and it's worth every penny. BENNETT RING PC

- Great colour clarity
- Brilliant blur reduction
- Adaptive sync

.....

- Rather expensive

VERDICT:

The TN panel helps keep the cost down, making this more affordable than the competing ASUS panel, but it's not quite as impressive as a result.

9

ASUS MG279Q

IPS gets a speed boost

PRICE \$999
www.asus.com.au



Asus has somehow pulled off the impossible with this brand new gaming display. Until now, low pixel response times were the domain of TN panels, but their narrow viewing angles and slightly average colours were less than amazing. On the other hand, IPS panels have become the preferred choice of colour purists, and their wide 178 degree viewing angle makes them perfect for larger displays and those who need to share their screen with other viewers. As such, IPS is now seen as the premium panel type, but its benefits come with a severe cost - high pixel response times. To put it bluntly, these beautiful screens have more motion blur than a V8 supercar photographed by a crappy camera. Yet ASUS has magically endowed its new MG279Q with pixels that are speedier than a Mexican Mouse on speed.

This large 27 inch display uses a 2560 x 1440 IPS panel, yet supports the rapid-fire refresh rate of 144Hz. It's also one of the new breed of Adaptive-Sync displays (aka FreeSync), but it has certain limitations not suffered by TN-powered Adaptive-Sync displays. For whatever reason, ASUS has only been able to enable Adaptive-Sync when this display is running between 35Hz and

90Hz; anything outside of this range and it reverts back to V-sync on or off, depending on what the user selects. The low end of this range is actually better than the BenQ monitor reviewed here, so games running at 35fps should still look nice and smooth. However, if you've got the necessary GPU grunt to pull it off, the lack of support over 90Hz is a pain in the posterior. At least you can always add extra high graphics options, such as downsampling the resolution, to drop the framerate to below 90Hz.

Looking at the physical appearance of the device, we see a relatively plain bezel design, mounted on an excellent stand that supports movement in all three axis. Inputs are well catered for, with dual HDMI/MHL 1.4 ports, DisplayPort 1.2, and mini-DisplayPort 1.2. Twin USB 3.0 ports round out the connection options. The OSD is controlled via a series of buttons at the rear of the display, which we always find a little annoying compared to front-mounted controls, but at least there's also a joystick for navigating. We love the GamePlus features - one draws a crosshair in the middle of the screen, which is basically cheating in games that don't allow the player to have a targeting reticule, while

the other displays an on-screen timer that can be used to measure cool downs within games.

As expected given the use of an IPS panel, colour and contrast performance were both excellent once we'd toned down the extremely high brightness, with plenty of detail in darker sections of games, while colours were punchy without being overly saturated. It's definitely got a better overall image quality than the AOC display. Motion blur was also extremely hard to pick thanks to the 4ms pixel response time, while the Adaptive-Sync feature worked flawlessly.

It might cost a little more than the AOC display in this roundup, but the use of an IPS panel with such an impressive pixel response time really is groundbreaking, and makes this our new favourite 27 inch gaming panel. We look forward to seeing a G-Sync version. *BENNETT RING*

- Stunning image quality
- Low motion blur
- Adaptive-Sync

.....
• A little more expensive

VERDICT:

ASUS has delivered our new favourite gaming display.

10

SOLID STATE SPEED DEMONS

In the last couple of years SSDs have blazed past mechanical hard drives as the storage type of choice for performance-hungry gamers. We've rounded up eight of the newest SSDs on the market to see how they compare. BENNETT RING

ANVIL'S STORAGE UTILITIES V1 8GB SSD Test

Read/Write Tests (MB/sec)

DRIVE NAME	Intel 750	HyperX Predator	Samsung 850 Pro	SanDisk Extreme Pro	Crucial MX200	OCZ Vector 180	Corsair Neutron XT	APACER Thunderbird
Read Tests								
Seq 4MB	693	1280	511	509	502	494	504	497
4K	32	33	30	26	26	26	26	18
4K QD4	138	121	134	121	106	74	124	52
4K QD16	528	307	378	343	331	260	339	101
32K	112	184	166	120	138	103	106	102
128K	189	447	320	194	304	252	244	266
Write Tests								
Seq 4MB	737	899	478	470	461	435	477	226
4K	189	85	110	60	111	126	50	52
4K QD4	567	214	302	270	324	271	299	141
4K QD16	979	459	341	289	338	321	321	243

Read/Write IOPS (Input/Output Operations Per Second)

DRIVE NAME	Intel 750	HyperX Predator	Samsung 850 Pro	SanDisk Extreme Pro	Crucial MX200	OCZ Vector 180	Corsair Neutron XT	APACER Thunderbird
Read Tests								
4K QD16 IOPS	135074	78497	96826	87847	84666	66682	86660	25753
Write Tests								
4K QD4 IOPS	145195	54764	77436	69014	82985	69399	76593	36204
4K QD16 IOPS	250536	117489	87292	73993	86437	82285	82253	62167

APACER Thunderbird PT910 256GB

Something's not right here...

PRICE \$549
www.apacer.com

This might be a PCIe-based SSD, but it's a great example of how all PCIe drives aren't created equal. The giveaway this isn't quite the performer it claims to be is in the type of PCIe interface it uses; while other drives now take full advantage of PCIe 2.0 x4 lanes, the Thunderbird is limited to a PCIe 2.0 x2 lane. It's also apparently a RAID product, with twin SSD drives on the card set up in RAID 0 mode. This meant that testing this drive threw up some very strange results.

Due to the all-in-one RAID 0 configuration, there's no need to mess

around with fussy drivers, and it can even be used as a bootable OS drive. At \$2.14 per Gigabyte, it's easily the most expensive drive in the roundup.

Our Anvil Storage Utilities test spat out very disappointing results for this drive, posting some of the slowest numbers in the test. To double check these results, we fired up CrystalDiskMark, which showed a huge improvement in the sequential read and write tests, with the former measuring 798MB/sec, the latter 252MB/sec. Sadly the other test results weren't as impressive.. BENNETT RING PC



- Excellent sequential performance
- Driver-free RAID 0 setup

-
- Very expensive
- Overall disappointing performance

VERDICT:

Considering the extremely high price, the Thunderbird simply doesn't deliver the expected performance.

5

Corsair Neutron XT 240GB

Corsair's flagship SSD range

PRICE \$219
www.corsair.com

Considering the company has a whopping eight different SSD product categories, we expected the Neutron XT to deliver blazing performance. While it's no slouch, unfortunately it's still not quite fast enough to beat the best of the best.

A quad core Phison PS3110-S10 powers this SSD, making it one of the only drives on the market to use a Phison controller. This in turn manages the Toshiba A19nm MLC flash memory, and it ships in the standard 2.5 inch form factor, with a depth of 7mm, making it suitable for most laptops. A generous

five year warranty is included, suggesting that Corsair has faith in the SmartECC™ and SmartRefresh™ data protection technologies provided by the Phison controller. It also includes SmartFlush™ and GuaranteedFlush™ protection in the case of sudden power failures.

The Neutron XT delivers outstanding sequential read and write performance. It's also extremely fast when it comes to 4K QD16 IOPS, suggesting that it'll make quite the capable OS drive. Alas, the rest of the figures simply don't match those of the fastest drives. *BENNETT RING PC*



- Excellent sequential and 4K QD16 IOPS performance
 - 5 year warranty
-
- Other performance figures are lacking
 - More expensive than faster drives

VERDICT:

It's a case of close but no cigar for Corsair's premium SSD.

7

OCZ Vector 180 480GB

Not in the same league

PRICE \$399
www.ocz.com

OCZ was the dominant force in SSDs for a while, after overtaking Intel to become the fastest SSD makers around, but the company hasn't led the race for quite some time. The OCZ Vector 180 aims to close that gap, while also coming in at a competitive price.

The keynote feature of the Vector 180 is its power-loss protection. Known as Power Failure Management Plus, it will protect any data that has already been written to the flash memory, but data stored in the buffer at the time will be lost. This level of protection is pretty

standard for consumer SSDs at this price point, but is backed up by a very generous 5 year warranty. A Barefoot 3 MO0 SSD controller handles the heavy lifting, and once again we see the use of Toshiba A19nm MLC NAND Flash chips. At 83 cents per Gigabyte the Vector 180 is smack bang in the middle of the pricing pack, but its read performance figures are far behind the likes of the Samsung 850 Pro. Write performance is much better, yet it's still not good enough to make up for the lower overall performance. *BENNETT RING PC*



- 5 year warranty
 - Solid write performance
 - Free cloning software
-
- Slower overall performance

VERDICT:

The Vector 180 is a decent drive, but it just can't keep up with the best SSDs on the market.

7

SanDisk Extreme Pro 480GB

Not that Extreme

PRICE \$399
www.sandisk.com.au

SanDisk is a little like Samsung in that it's one of the world's biggest Flash memory makers, which can't hurt when you're building a product that is comprised primarily of said memory. This is possibly why the Extreme Pro comes with such a competitive price, of only 79 cents per Gigabyte. The good news is that performance hasn't tanked with the price, but yet again we see another drive that fails to live up to the 850 Pro's heights.

Like the 850 Pro, this drive is now over a year old, but it hasn't held up to the test of time quite so ably. It uses the

company's own SanDisk 2nd Generation 64Gbit 19nm MLC, but they've had to tap Marvell to provide the SSD controller, this time using an 88SS9187 controller. SanDisk obviously has faith in the reliability of this combo, endowing the drive with a massive 10 year warranty.

The Extreme Pro isn't a woeful performer, but it's also a long way off the 850 Pro. Therefore we simply can't recommend this drive considering the 850 Pro has it beat in price, performance and with a matching warranty. *BENNETT RING PC*



- Solid performance
 - Excellent price
-
- Average performance across the board

VERDICT:

At over a year old, we feel that SanDisk needs to refresh the Extreme Pro for it to remain a viable alternative to Samsung's wunderchild.

7

Crucial MX200 500GB

A budget-priced performer

PRICE \$272
www.crucial.com

At a mere 69 cents per Gigabyte, the MX200 is easily the most affordable SSD in our roundup, coming in well below the price of other SATA 3 drives. Crucial has positioned this as the perfect entry-level drive, yet has managed to deliver a budget package that isn't embarrassingly slow.

Marvell has been tasked with supplying the SSD controller on this drive, in the form of the 88SS9189 SATA controller. This is used to control the 16nm synchronous MLC NAND memory used on the drive, and it uses Dynamic Write Acceleration which dynamically switches the MLC memory to SLC on the fly. RAIN and Exclusive Data Defense are two of the techniques used by this drive to stop data corruption, and it even includes 256-bit AES encryption, which is outstanding for a drive of this price. Acronis True Image HD software is also included in the box, making cloning your old

drive to the MX200 an absolute breeze.

When put through our Anvil Storage benchmark, the MX200 churned out some surprisingly good results. While it was never the fastest in one test, its overall figures illustrate well-balanced performance across the board. Most surprising was its IOPS numbers, with 4K QD4 IOPS in particular teaching the other SATA 3 products a thing or two.

With a decent three year warranty, solid overall performance and the inclusion of free cloning software, Crucial has delivered an excellent first SSD for those on a relatively tight budget. *BENNETT RING PC*



- Solid overall performance
 - Free cloning software
 - 3 year warranty
-
- Not the fastest on the block

VERDICT:

The MX200 is a worthy contender if you're looking for the best value for money.

9

HyperX Predator 480GB

Kingston is back in the game

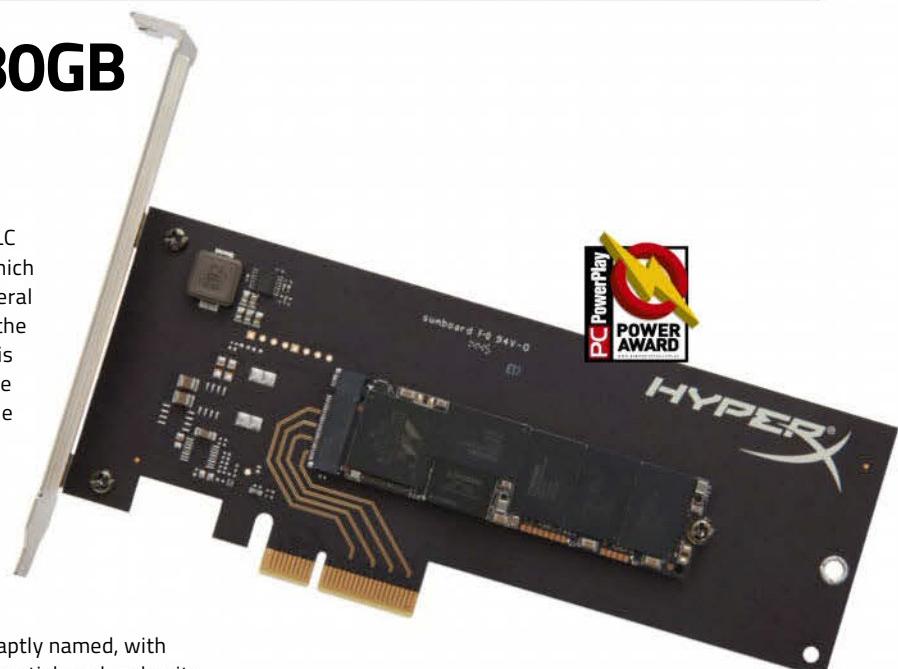
PRICE \$669
www.kingston.com/en/hyperx

Kingston has had a tough time of it of late, with its SSDs failing to match the performance of the memory juggernauts such as Samsung and SanDisk. The Predator is the company's latest SSD, and we're happy to say that the company has finally released a drive that is as impressive as the HyperX brand used to be. It mightn't be cheap, but it's one helluva speed demon.

This drive uses a PCIe 2.0 x4 interface, which gives it a huge leg up over SATA 3 and PCIe 2.0 x2 drives. It's actually an M.2 SSD mounted on a PCIe card, and removing it from said card is a cinch... but doing so will void your 3 year warranty, which is a shame. Thankfully it's possible to buy the same drive as a pure M.2 variant. Marvell's 88SS9293 four-lane PCIe 2.0 controller is responsible for this drive's blazing performance, which is used to drive the popular

Toshiba A19 MLC NAND Flash, which is found on several other drives in the roundup. Acronis cloning software is included in the box, just like several other SSDs.

Our performance numbers show that the Predator is aptly named, with the fastest sequential read and write performance of the group. Its other read/write numbers are a bit of a mixed bag, but it shines once again in the 4K QD16 IOPS write test. At a cost of \$1.39 per Gigabyte the Predator isn't cheap, but it delivers unrivalled sequential performance. *BENNETT RING PC*



- Incredible sequential read/write performance
 - Free cloning software
-
- Smaller file transfer results aren't so glowing
 - Rather expensive

VERDICT:

If you're looking for the fastest sustained read and write performance, the Predator has no substitute.

9

Intel 750 1.2TB

Two words – Crazy Fast.

PRICE \$1499
www.intel.com

Intel might have led the SSD market when consumer drives first became affordable, but the performance of its drives has played second fiddle to its reliability in recent years. Simply put, Intel drives weren't as fast as the competition, but they were renowned for being basically indestructible. With the new 750 drive, Intel hasn't just caught up to the rest of the pack – it's left them eating its dust.

This is thanks to the employment of Non-Volatile Memory Express technology, known as NVMe for short. It's a new method of accessing the memory on the drive, and makes the most of the parallelism found in today's SSDs. Where today's AHCI drives only allow one command queue, with 32 commands per queue, NVMe boosts this exponentially, up to a whopping 65536 queues, with 65536 commands per queue. The result is a massive increase in the number of IOPS (Input/Output Operations per Second) of the drive.

BENNETT RING PC

Put simply, the Intel 750 simply wiped the floor with the competition when it came to IOPS, with more than twice the 4K QD16 IOPS of its nearest competitor. Write performance was also excellent, though some of the read numbers were a little low.

It might cost a little more, at \$1.34 per Gigabyte, but the Intel 750 is the undisputed king when it comes to IOPS performance. As such it'll make for the perfect OS drive or game install drive, and when combined with Intel's legendary reliability makes this a safe bet for those craving the ultimate in performance.

BENNETT RING PC



- Insane IOPS performance
- Excellent overall read/write performance
- 5 year warranty
-
- Requires NVMe compatible BIOS to work as boot drive

VERDICT:

Intel has leapfrogged the competition thanks to its use of NVMe technology, delivering the fastest SSD we've ever tested.

10

Samsung 850 Pro 512GB

One drive to rule them all

PRICE \$375
www.samsung.com.au

Welcome to the SATA 3 SSD that has hurt the SSD industry like no other. Samsung's 850 Pro continually sets the benchmark for blistering performance at an excellent price, and it has left its competitors reeling since releasing over a year ago. Considering its age, we're astounded that this single SSD is still able to teach brand new models a thing or two, proving just how powerful making every component in your SSD in-house can be.

Samsung makes every single component used in the 850 Pro, from the 3-core MEX controller to the Samsung V-NAND Flash memory used within. As the biggest manufacturer of NAND Flash memory in the world, Samsung obviously knows a thing or two about building the fastest memory possible, and the V-NAND used within is built using a special 3D process which stacks the memory cell layers on top of one another. Full 256-bit AES encryption

is supported, while the incredible 10 year warranty is twice that of most competitors.

At just 81 cents per Gigabyte, the 850 Pro sits on the affordable end of the mainstream performance pack, but its benchmark figures do not. It scored the top result across nearly every benchmark test, excluding numbers from the far more expensive PCIe-based SSDs; a remarkable feat considering the drive's age. As a result we have no hesitation in continuing to recommend the Samsung 850 Pro as the best SATA 3 drive on the market. We hope the competition catches up soon, as having a dominant product for such a long period is surely going to make the market shrink.

BENNETT RING PC



- Excellent value
- Top performance
- 10 year warranty
-
- It's so good that it must be hurting other SSD makers
- Only 465GB is usable

VERDICT:

Make no bones about it, even at a year old this is the best SATA 3 SSD that money can buy.

10

HEADSET ROUNDUP

Blistering speed and a stunning framerate are only part of the landscape of gaming. To make gaming a complete experience you also need them to sound great. To this end we've rounded up nine of the newest and best headsets around.

ASUS Strix 7.1

Cranky ear owls

PRICE \$249
www.asus.com/au/

Almost the polar opposite of the ATH-R70x headset, the ASUS Strix 7.1 comes with all the bells and whistles you associate with gaming headsets. There are lights, EQs, an attached mic and a flashy design that makes the headset look something akin to a giant owl that is disappointed with your chosen lifestyle, no matter what it might be. To say the headset is huge is something of an understatement. It weighs in at 350g minus the cable and has huge ear cups, complete with giant orange "eyes" that can be set to breathe or simply glow orange. The size of the headset makes sense when you take into account everything in it, however. The Strix 7.1 headset provides real, not virtual 7.1 surround sound, and you need a lot of realestate to fit all of those neodymium drivers. There are 10 in all – two 40mm pairs for the front speakers and sub, a 30mm pair for centre speakers and two 20mm pairs providing the grunt for the rear and side channels. The upside of the ear cups being so huge is that even the biggest ears should fit inside them comfortably, the downside being that the cups do have a tendency to press on the hinge of the jaw, making them progressively less comfortable over a prolonged gaming session.

The most impressive feature of the Strix 7.1 isn't the headset, but rather the appealingly chunky control box it attaches to. Inside this box is a sound card and a host of easy controls for volume and settings. The Strix has four preset game modes to choose from that tweak the EQ to suit a chosen style

of gaming. FPS gives a boost to the bass and low range making gunfire punchier and the Footstep Enhancer does the opposite, boosting the mid and upper ranges to enhance background noises. Both the Action/RPG and Racing presets focus on the mid ranges, with the Action/RPG setting focussing on the higher mid-range to accentuate dialogue and soundtrack and Racing focussing on the lower mid-range to make engine noises grunter. The mic works well for the most part, but if you used the environmental noise cancelling built into the control box (inconveniently hidden on the bottom of the unit) it does sometimes identify your voice as environmental noise and try to occlude it. Speakers can be passed through the control box, giving them access to the EQs and simple controls. It's a neat touch that's much appreciated.



If you're looking for surround sound in a gaming headset, virtualisation will never be as good as the real thing, but you have to pay for it. The Strix 7.1 isn't a cheap headset but the sound quality is excellent if you're looking for an immersive soundscape and don't mind your headset being tied to your PC or looking like an angry raptor has perched on your head to judge all your current and future misdeeds. DANIEL WILKS PC

- Angry owl
- Great control box
- Good sound

- Angry owl
- Huge and plastic
- Heavy

VERDICT:

Great sound and real 7.1 surround but huge, plastic and not that comfortable over time

8

Audio Technica ATH-R70x

Heaven for your ears

PRICE \$499
www.audio-technica.com.au



While most of the headsets we're looking at in this roundup are specifically gaming related with all the bells and whistles that usually come with their place in the market – attached microphone, flashing lights, pumped bass to accentuate explosive things – there's also a place for professional studio monitor headphones in the world of gaming. If you have a good sound card and want to appreciate subtleties in sound, the richness of a soundtrack or simply use your headphones for more than just gaming, the ATH-R70x should be your dream upgrade.

Straight out of the box you know that there's something special about this headset. It's feather light, weighing in at just 210g thanks to an attractively utilitarian design. A single sprung metal headband supported by Audio Technica's unique cushioned paddles holds the two well cushioned ear cups. The headband is tight but not at all uncomfortable, holding the headset firmly in place. While we've had some problems with the AT head paddles in the past – the last AT headset we tried needed a rubber band between the paddles to make them properly supportive – but the tightness of the band makes them super supportive over the longest gaming sessions.

As attractive and comfortable as they are, the most compelling feature of the R70x headset is the dead flat EQ. Many of the headphones manufactured by Audio Technica feature a tweaked AT EQ, slightly warming the sound to provide a satisfying overall experience,

but with the R70x there is no fiddling whatsoever, leaving a very smooth and balanced sound signature. There are no peaks, dips or distortions in the sound reproductions that usually result from a tweaked EQ. Even without a modified sound profile, the R70x have a lovely rich and slightly warm tonality with smooth transitions from bass through to treble. It may be a little too smooth for some, especially if you prefer your music and gaming on the more bombastic side.

For RPGs, adventure or anything with extensive dialogue and a general lack of explosions, the R70x are an absolute joy to listen to, but although the sound reproduction is wonderfully natural, if you're a serious FPS player you'll probably find the sound mix a little too flat, with the equal weighting given to all audio ranges making combat sound a little less exciting, and explosive than it should. The lack of a microphone might also put some people off.

Any real complaint we have with the headset is little more than nit-picking. The left/right markings are hard to find and read meaning you might occasionally have to take valuable seconds to check or readjust your headphones, we'd prefer oval

ear pads than round as they fit most ears better and the impedance of the drivers requires a decent amp to get the absolute most out of the headset. Aside from those petty gripes, we're pretty much in love with this headset – it's comfortable, elegant and reproduces excellent sound from a variety of sources. DANIEL WILKS PC

- Amazing sound
- Excellent build quality
- Feather light

-
- Expensive
- No mic

VERDICT:

They're far from cheap but you'll be hard pressed to find better headphones for the price

10

Roccat Kave XTD 5.1 Analog

Real 5.1

PRICE \$239
www.roccat.org

The successor of the Roccat Kave 5.1, the XTD looks all but identical to its predecessor, but crams a lot more functionality into the updated headset for only a relatively small increase in price. The cushioned headband holds two chunky, ear cups, each with an equally chunky faux leather ear cushion. At first glance they look rather uncomfortable, and indeed the cushions are rather stiff for the first few hours of wearing them, but the headset is deceptively comfortable. The microphone is removable but this seems a little unnecessary as the headphones aren't particularly portable and are connected by four analogue jacks for the audio channels and a USB connector for power so aren't any use for on the go listening.

The big difference between the Kave 5.1 and the Kave XTD 5.1 Analog is the inclusion of a soundcard in the headset and three audio drivers per ear cup. The

result is some pretty damn excellent audio quality bolstered by some feature rich if lazy software. The directionality of the 5.1 surround is good in mid ranges but does get slightly blurred when it comes to the higher and lower registers. The microphone is decent but uninspired for the most part, but for online gaming and Skype will serve its purpose with the minimum of frills – namely disguising your voice as one of four uninteresting alternatives. The Kave XTD 5.1 doesn't have the best sound reproduction or looks or looks in the roundup, but for the price point it offers some of the best value for money when it comes to features and quality. DANIEL WILKS PC



- Real 5.1 surround
- Good build quality
-
- Lacklustre mic
- Some blurring at high and low ranges

VERDICT:

Decent value for money when you consider the features

7

Turtle Beach Earforce Z60

Absurd bass

PRICE \$139
www.turtlebeach.com

Even when not using one of the preset audio profiles – gaming, cinema or music – and setting the EQ to flat, the Earforce Z60 headset still has some really impressive bass. The massive 60mm driver in each large, comfortable ear cup deliver a wide range of high fidelity low range tones, making explosions, engines and bullets really satisfying. Unfortunately even with the EQ set to flat, the high ranges are a bit muted. Even with the music setting chosen, the high range sound quality is a little disappointing. Set to cinema mode, the headset concentrates on the mid ranges making sure that dialogue is front and centre and not drowned out by the soundtrack of effects. The gaming mode is most satisfying when playing something explosive, as the 60mm drivers ramp up the bass response to the point of delicious absurdity.

The DTS Headphone: X virtual surround technology does a good job

with directionality but as always falls far short of the crispness of real 7.1 sound. That said, the DTS Headphone: X tech does offer really excellent vertical virtualisation, clearly defining sounds that come from above. The removable mic does a decent job of recording and thanks to the inline controls, mic volume can be tweaked on the fly negating any need to fiddle with settings on your PC.

Although great for FPS and action, the huge drivers in the Earforce Z60 aren't quite up to the job of providing a universally satisfying experience, with music and some gaming genres definitely suffering from the lacklustre high range response. DANIEL WILKS PC

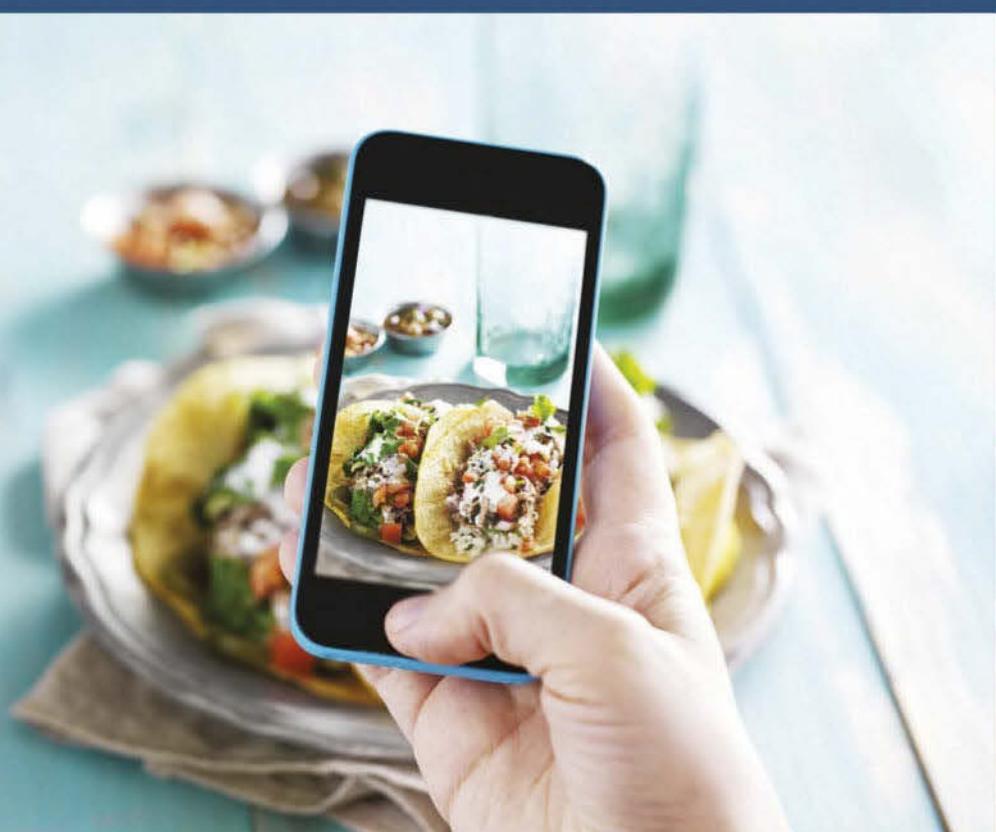


- Powerful drivers
- Huge bass
- Good virtual 7.1
-
- Disappointing high range

VERDICT:

Great for explosions and action but lacking for music and some genres of movie

7

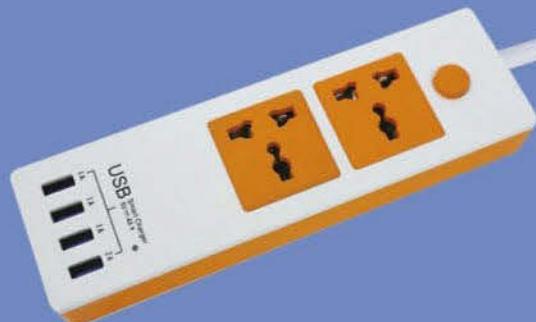


UPLOADING...



RATE

You do a million things on your smart devices everyday.
Charging it should only be a small part of it.



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Audio Technica ATH-M40x

Simple design, excellent value

PRICE \$149
www.audio-technica.com.au

Much cheaper than the ATH-R70x, this headset still shows off Audio Technica's skill at making truly excellent headphones. As with the R70x, the M40x are a pair of headphones pure and simple. There are no in line controls, no mic, no flashy effects, just excellent sound quality and comfort. The design is simple but solid, with a single padded headband holding the two comfortably cushioned, hinged ear cups, each featuring a rare earth 40mm audio driver. The build quality is excellent and feels sturdy. The headband could afford to be a little more padded for added comfort but even with the current level of padding you can wear the ATH-M40x for hours with no problems. The simple design also makes them perfect for use on the go, paired with your mobile or MP3 player.

Sound reproduction is for the most part excellent. Given that this headset is intended primarily for music, the mid-



ranges are excellent, with wonderful, clear and warm reproduction of voice and most instruments. The high ranges are also excellent with crisp tones without a touch of tinniness. The only place the headset falters is with bass. The bass response isn't bad by any stretch of the imagination, but the 40mm drivers aren't quite up to giving bass the oomph it really needs to be impressive. As a result shooters come across as a little flat, but most other genres, especially those that feature extensive dialogue sound fantastic.

DANIEL WILKS PC



- Excellent sound
 - Solid build
 - Comfortable
-
- Bass lacking oomph
 - No mic

VERDICT:

Excellent sound quality for the price but the bass is a bit weak for explosions

8

Steelseries Siberia Elite Prism

Training wheels for your head

PRICE \$255
www.steelseries.com

The absurdly massive, overstuffed pads on the Elite Prism make the headset look something like a set of training wheels for your head. They're huge. On the upside this sheer size does make for some good passive noise cancelling, but it also makes the headset very hot. Ear sweat, and the weight make for some less than entirely comfortable gaming sessions. The design as a whole works, with a nicely padded strap supporting the majority of the weight and each ear cup featuring discrete volume and mic controls.

As the premium Siberia headset, the Elite Prism comes with a suite of great extras, including a USB sound card that delivers virtual 5.1 surround and a line out port in the right ear cup for sharing audio with a second headset. Out of the box the audio quality of the Elite is good, but the high ranges come across as a little flat. With some tweaking of the EQ in the Steelseries



Engine you can definitely improve the overall performance of the headset. The mic is by far the best of the current Siberia range with little in the way of tweaking needed to make your online taunts heard by all and sundry. The major sticking point of the Elite is the fact that the virtual 5.1 sound is not particularly great, with a lack of definition in directionality and some flattening in the audio profile. Given the fact that there are cheaper headphones with better surround quality it makes it somewhat hard to justify the price.

DANIEL WILKS PC



- Good stereo sound out of the box
 - Great features
-
- Sweaty ears
 - Heavy
 - Lacklustre 5.1

VERDICT:

There is a lot to like about the Elite Prism headset outside of the 5.1 performance and price

7

Steelseries Siberia V3/Prism

More of a good thing

PRICE \$99/\$149
www.steelseries.com

Similar in design to the great Steelseries Siberia V2 headset as well as the pricier V3 Prism, the V3 headset features two large ear cups connected with a structural band and a floating head strap that sits the headset lightly and comfortably in place. As far as design goes, the Siberia V3 is a winner. It looks great and is extremely comfortable to wear. It's also equally good when it comes to sound quality. Like the V2, the Siberia V3 has a flattened EQ which means that there isn't the bass enhancement you find in the majority of gaming headsets. The 50mm drivers provide excellent audio through the mid to high ranges but lack a little bit of oomph when it comes to the bass. For the most part this isn't hugely noticeable, but does become a little bit of an issue when playing bombastic games like CoD or Wolfenstein. The settings for the EQ can be tweaked using the universal

SteelSeries Engine software suite, but we didn't experience a huge difference in response before there was noticeable bass fuzz.

As with the cheaper V3, the V3 Prism is a comfortable headset, with a good, solid build quality and decent looks, with good sound reproduction in the mid to high ranges but a microphone that doesn't quite live up to its promise, often recording at far too low a volume or making users sound tinny. The addition of a USB connector and programmable lights on the ear cups don't really justify the boost in price. **DANIEL WILKS PC**

SIBERIA V3 PRISM

SIBERIA V3



- Excellent mid and high range response
- Comfortable
-
- Lacklustre mic
- No inline controls

VERDICT:

The bass lacks a bit of oomph but otherwise very solid gaming headsets

V3 **8**
V3 Prism **7**

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Learn more about the S10 and the Three Chamber Design at www.antecsignature.com

Steelseries Siberia Raw Prism

Cheap and cheerful

PRICE \$59
www.steelseries.com

As soon as you take them out of the box you can tell that the Raw Prism is the budget little brother of the rest of the Siberia series. The build quality isn't near that of its more expensive siblings, but that doesn't mean it's shoddily put together, just that it has been designed with the idea of keeping costs down to a minimum. Rather than the usual head band and floating strap design of the rest of the Siberia range, the Raw headset instead uses a single cushioned plastic headband to hold the large, cloth padded ear cups. Rather than a boom mic that snakes from the left ear cup, the Raw instead uses a discrete mic built into the ear cup, making it a little difficult to get the settings right so that your voice is clear. That said, the mics performance isn't a huge deal worse than the mics on the V3 or V3 Prism. Take from that what you will.

The sound quality of the headset



is a little flat overall, but mid and high ranges are well reproduced for the most part. There is a little bit of muddiness and honking at high volume, but for \$59 the performance is more than acceptable. As with the other Siberia headsets, the bass response is somewhat lacking, more noticeably so in the Raw than the more expensive offerings. Even so, if you've working on a tight budget and want a headset that will satisfy your gaming needs, the Siberia Raw Prism is a winner. **DANIEL WILKS PC**



VERDICT:

Steelseries has cut corners to hit a budget price point but still deliver quality

8

Kingston HyperX Cloud II

King(ston) of the hill

PRICE \$149
www.kingston.com

The simple and chunky design of the HyperX Cloud II headset is all but identical to that of the original HyperX Cloud and indeed the underlying tech is only a slight revision on the original, but thanks to the excellent design and performance of Kingston's first gaming headset, the Cloud II is an example of a good thing made better through iteration.

Two huge 53mm drivers provide excellent sound quality and not just for the price range. The full range of sound is excellent, all the way from the punchy bass through to the clear treble. In addition to the standard 3.5mm jack that makes the Cloud 2 a suitable headset for nearly any audio device, the headset also comes with a USB virtual 7.1 soundcard that also features simple line controls. The 7.1 virtualisation is good for the most part, with Kingston's software generally doing a good job working out from



which direction each sound originates, but the overall audio quality takes a little bit of a hit, becoming slightly less defined than a straight stereo input. The detachable microphone is also excellent, with the USB soundcard providing external noise cancelling, volume monitoring and normalisation as well as echo cancellation.

Who would have thought that a company best known for making memory would release one of the best affordable gaming headsets on the market? The HyperX Cloud II proves that Kingston definitely has a future in the headset game. You'd be hard pressed to find a more satisfying and feature complete headset for the price. **DANIEL WILKS PC**



VERDICT:

You'll be hard pressed to find a better mid range gaming headset

9



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BILLION[®]

GAMING LAPTOP GROUP TEST

If you don't have the space for a full tower PC or want your gaming portable, BENNETT RING has found the solution.

While sales of PC desktops continue to flounder like the Liberal's budget in the parliament, there's one segment that is experiencing strong growth – gaming laptops. The confluence of shrinking hardware sizes, better battery life and more efficient silicon has finally delivered on the promise of gaming laptops that can play more than just Clash of Clans. We've taken a look at four of the biggest brands to see how their unique approach to this market; while some favour ultra-portable machines that can be plugged into powerful GPU docking stations, others have delivered

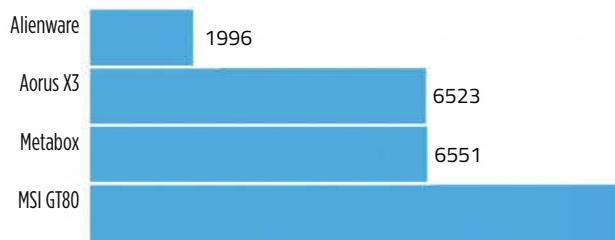
massive high-powered monstrosities only slightly more portable than a bar fridge.

BUYING A GAMING LAPTOP

The most important aspect when buying a gaming laptop is the dedicated GPU found inside. Ignore the marketing material – a GeForce GTX 960M can barely run Counter Strike, let alone Star Wars Battlefront, no matter what NVIDIA tells you. Be very careful when selecting a GPU. NVIDIA has been known to misrepresent

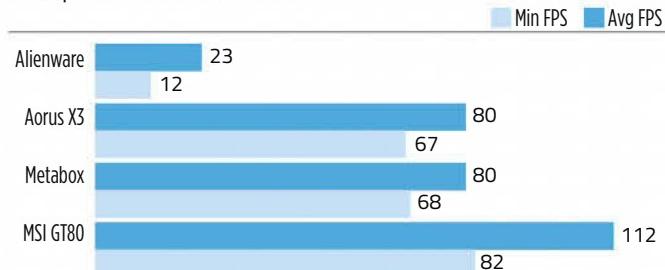
970M is nothing like a desktop GTX 970, despite the two being almost identically named, so don't expect to be able to run your mobile games at the same detail settings as the desktop part. The CPU is also important, but most less so than the GPU, as most gaming laptops tend to have CPUs that are all in the same ballpark. And don't even bother worrying about battery life – if you're going to be playing games on these laptops (duh, which

3DMARK Firestrike Score



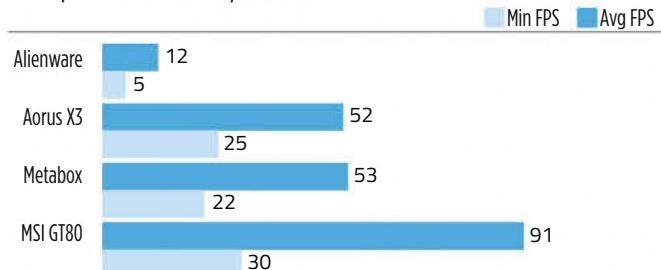
GRID AUTOSPORT Benchmarks

1080p, 4x MSAA, Ultra Detail



METRO 2033 Benchmarks

1080p, Max Detail, PhysX Disabled



Alienware 13

Now with added Graphics Accelerator!

PRICE \$1599 TO \$2549 DEPENDING ON CONFIGURATION
www.alienware.com.au

It might be due to the fact that our review sample had been used before, but the first thing we noticed about this laptop is how damn slow it is when using the Windows desktop. Even such simple tasks as opening a file took ages, surprising considering our sample had a 512MB SSD in place.

The Intel Core i5 4210Y is only a dual core critter, but it's been paired with a relatively healthy 8GB of memory, yet its top speed of 1.9GHz is simply woeful compared to other gaming laptops. Graphics duties are handled by NVIDIA's lacklustre GTX 860M, which explains why it did so poorly in our benchmarks, taking out the bottom spot in the roundup. Yet Alienware has paired it with a stunning 2560 x 1440 display.

It turns out that our review sample isn't even offered on the Alienware website any more – the lowest version offered there has a newer Core i5 5200U CPU with an NVIDIA GTX 960M GPU.



But even these specs will fail to deliver compelling gaming performance. If there's one positive to this laptop, it's the ability to hook up the Alienware Graphics Accelerator, a large box that can host a desktop graphics card. You'll pay several hundred extra for this though, along with the additional price of the graphics card that you choose to install inside.

When our review sample is measured against the offerings from other suppliers, we simply can't recommend it considering the price. *BENNETT RING PC*

- Graphics Accelerator is a cool feature
- Very portable
- Nice display
-
- Terrible performance
- High price

VERDICT:

We're not sure why Alienware sent us such an under-specified sample, but it simply bombed compared to the competition.

4

Aorus X3 Plus V3

A potent pocket-sized performer

PRICE \$2899
www.aorus.com

If you want a highly mobile gaming laptop that packs a decent punch, you're going to need to shell out some serious dosh to do so. The X3 Plus V3 is one such gaming laptop; weighing just 1.87kg it's about as small as a real gaming laptop can get, yet it's got the grunt to handle most of today's games. It's also got a price tag that is close enough to three grand that you can smell the pile of 30 \$100 notes that it costs.

The 13.3 inch display packs in an incredible 3200 x 1800 resolution, and it's an absolute stunner. It'd require dual GPUs to run games at this resolution, but there's simply no room inside this laptop for such a solution, so Aorus has gone for NVIDIA's new GTX 970M instead. It's quite the capable performer, as our benchmarks attest, and as it should be for this price.

Intel's i7 4710HQ is an able compatriot for the NVIDIA GPU, with



a top speed of 3.5GHz, and it's even a quad-cored, Hyperthreaded beauty. It's amazing Aorus has managed to squeeze this inside such a small laptop, but the penalty has been noticeable fan noise while under load. It's not unbearable though. Throw in a 512GB SSD and this is about as powerful as a 13.3 inch gaming laptop can get, making the high price tag somewhat easier to justify.

BENNETT RING PC

- Powerful CPU and GPU
- Very mobile
- Crisp display
-
- Very expensive
- Audible fan noise under load

VERDICT:

If you don't mind paying for it, the X3 Plus v3 is one of the most capable ultra-portable gaming laptops around

8

Metabox Prime P650SE

Power at a very nice price

PRICE \$2081
www.metabox.com.au

This kick-arse gaming laptop shares many of the same specs as the Aorus laptop in this roundup, but instead places them inside a larger chassis dictated by its 15.6 inch display. As a result, Metabox hasn't needed to get too tricky with squeezing such powerful hardware into a tiny space, which is probably why the Metabox is significantly more affordable. It's no behemoth though, tipping the scales at just 2.5kg, making it relatively portable despite its size.

Once again we see NVIDIA's excellent GTX 970M handling the graphics load, while Intel's i7-4720HQ is even better than the CPU found in the Aorus, with its top speed of 3.6GHz. This potent pairing should smash through most of today's games without issue. A whopping 24GB of DDR3 memory is overly generous, while the 250GB Crucial SSD is arguably this laptop's only weak point; it'll fill up in no time, but it's possible to upgrade



this option at purchase.

The 15.6 inch screen sticks with the trusty old 1920 x 1080 resolution, which is the perfect match for the NVIDIA GPU within. It's not quite the sexiest display we've ever seen, but it does the job ably considering this is such a well-priced machine. There's even 802.11ac Wi-Fi included, which is simply stunning for a two grand laptop with so many juicy bits.

We're simply amazed by the value afforded by this gaming laptop. For two grand it's hard to beat, and we can't think of anything Metabox could have done better. *BENNETT RING PC*



- Amazing value
 - Excellent performance
 - Quite portable
-
- Slightly small SSD

VERDICT:

Two grand buys you a whole lot of gaming laptop if you spend it on the Prime P650SE

10

MSI GT80

Absolutely insane, and we love it

PRICE \$6299
au.msi.com

Welcome to the biggest, baddest gaming laptop money can buy. With a huge 18.4 inch display, it's big enough to fit a full-sized SteelSeries mechanical keyboard, and it's great to see MSI has used Cherry MX keys. Weighing a hefty 4.5kg it's not exactly portable, but the specs inside more than justify its weight.

The powerful Intel i7-4720HQ processor's quad cores hit 3.6GHz under load, and MSI has paired it with not one, but two GeForce GTX 980M GPUs in SLI mode. Even The Witcher 3 will run like a dream on this configuration, with all settings maxed, which has to be a first for a gaming laptop. 16GB of DDR3 memory is plenty, while long-term storage is well catered for with 485GB of RAID 0 SSD storage, along with another 675GB of mechanical storage. SoundBlaster takes care of the audio needs, delivering some of the best laptop audio we've heard. Killer's brand



new DoubleShot Pro handles both Ethernet and Wi-Fi.

If there's one flaw with this laptop, it's the 1080p resolution of the display. Considering it's almost 19 inches across, this is a tiny bit low; we'd have much preferred a 2560 x 1440 display, especially considering the dual GTX 980M GPUs could easily power it.

It's also mind-blowingly expensive. However, if money is no obstacle and you want the most powerful gaming laptop on the market, look no further than the GT80. *BENNETT RING PC*



- Twin GTX 980Ms!
 - Incredible specs
 - Huge screen
-
- Could have used a 2560 x 1440 display
 - Expensive

VERDICT:

Make no mistake, this is as powerful a gaming laptop as you'll find on the market.

9

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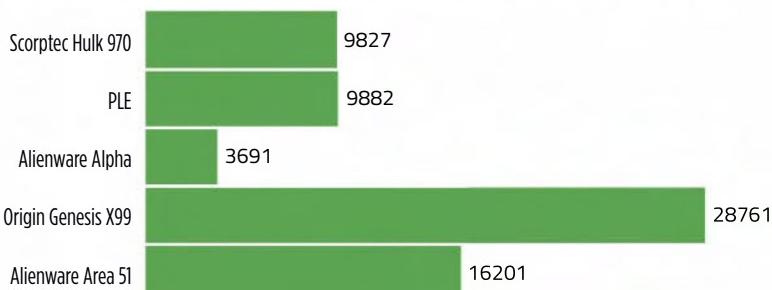
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OFF THE HOOK, OFF THE SHELF

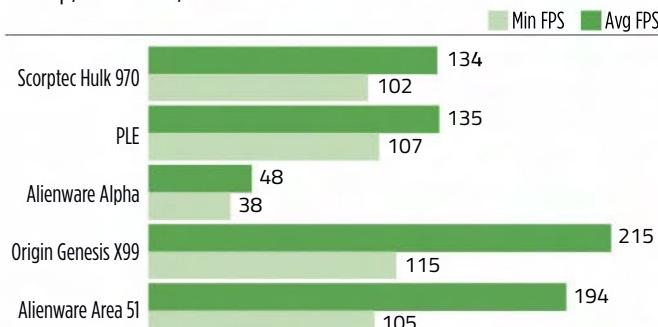
It's ok to admit that you can't be bothered building a PC from scratch. Some folks don't have the time nor inclination to figure out what they want, or how to put it all together without sending expensive components to the giant scrapyard in the sky. Besides, many companies now sell pre-built gaming rigs at a price that makes them extremely competitive with DIY builds. We've rounded up five killer systems across a huge variety of prices to see just what's on offer.

3DMARK Firestrike Score



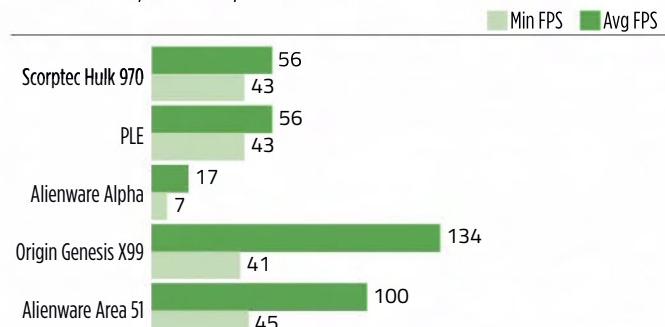
GRID AUTOSPORT

1080p, 4x MSAA, Ultra Detail



SHADOW OF MORDOR

2560 x 1440, 4xMSAA, Ultra Detail



Scorptec Hulk 970

A beautiful green gaming machine

PRICE \$2399
www.scorptec.com.au/systems/scorptec/25/272

Built by Aussie company Scorptec, this machine is aptly named thanks to the striking (*and, unfortunately, unprintable – art*) green colour scheme used throughout. As well as the beautiful case NZXT 440 case which has green highlights, the builders have installed a couple of strips of green LEDs around the large Perspex window. Scorptec has even gone to the trouble of using green BitFenix sleeved power and SATA cables, a small touch that we appreciate tremendously. It's obvious that a lot of thought has been put into this build, more so than machines twice its price. The net result is one of the most beautifully put together cases in our roundup, with not a single stray wire contaminating the immaculate interior.

Heading inside the case reveals a range of products that are well balanced. MSI's Z97S Krait Edition motherboard allows for easy overclocking of the CPU, and its clean design fits well with the overall aesthetic of the case. It's got room for dual GPUs if you decide to upgrade in future, as well as an M.2 slot for the time when these drives drop in price. If there's one flaw, it's the use of the older Realtek ALC892 codec for onboard audio, which has been surpassed by newer onboard solutions from both Realtek and Creative. After mentioning this to Scorptec, they went to the trouble to add the ability to add a custom soundcard to the build via their website – we think the ASUS Xonar DSX for \$69 is a good bet. Now that's what we call a responsive retailer.

Residing in this motherboard is Intel's speedy Core i5 4690K processor. This quad cored CPU foregoes Hyperthreading to keep the price down, but it's a feature that is basically irrelevant for gaming. With a top speed of 3.9GHz, overclocking it to 4.5GHz shouldn't be too hard, especially as Scorptec has endowed the CPU with a NZXT Kraken X41 All-in-one



liquid cooler. Eight gigabytes of DDR4 1866MHz is the bare minimum we'd accept in a gaming rig, but upgrading it to 16GB shouldn't be an issue.

Graphics duties are handled by the excellent Galax GeForce GTX 970 Hall of Fame Edition. This is a premium version of the GTX 970, and based on prior Galax samples we've tested should easily be overclockable to speeds approaching a GTX 980. Meanwhile Samsung's excellent 850 Pro handles the OS install. It's only a 250GB model, which is getting a little on the small side compared to today's 500GB SSDs, but there's still around 211GB of spare space for your favourite games. A huge 2TB Seagate Barracuda is also included for your less demanding storage needs. It's all powered by a Corsair CX750M power supply.

As well as the included water cooler, Scorptec has equipped the case with three Thermaltake Riing case fans, all with green LED lighting, to help keep the interior cool. We're happy to report that the machine stayed whisper quiet during testing.

When it came to performance, the components within proved this machine has ample power to run today's hottest games at 1080p with all of the details cranked. It basically performed neck and neck with the PLE system, but we think the Hulk is the slightly better buy thanks to its stunning design. Either of these systems are excellent value for money, but if you want a PC that looks far more expensive than it really is, the attention to detail in the Hulk's build makes it our preferred option, but only just. *BENNETT RING PC*

- Brilliant build quality
- Aesthetically stunning
- Balanced components

- Dated onboard audio
- Small SSD
- No optical drive

VERDICT:

The Hulk just pips the PLE to the post thanks to its sexier looks.

9

PLE Achromic GTX970

A slightly different take on how to spend two grand.

PRICE \$2249
www.ple.com.au

PLE Computers are another Aussie system builder and IT store, and it's interesting to see just how similar this machine is to the ScorpTec Hulk. They're both priced within \$150 of each other, and the key components used within are all based around the same specs, but with differing brands. Let's see where they differ.

The most obvious contrast between the two is in the overall aesthetic. To be blunt, we prefer the ScorpTec Hulk, but it's arguably a matter of taste. PLE has gone for Thermaltake's V51 Black Core tower, which has a much more industrial look to it than the sleek green lines of the NZXT case used in the Hulk. PLE has also included a few LED lights within this case, but they don't compare to the green LEDs used in the Hulk. However, if you want a case that won't light up the corner of your gaming den like a blinking Christmas tree, you'll probably prefer the much subtler lighting scheme of the PLE machine. A nice touch is the inclusion of a powerboard with this system, which includes surge protection.

Looking inside the case we see the same attention to cable hiding exhibited by other top-tier system builders, with nary a wire out of place. PLE has used BitFenix sleeved cables to maintain the black and white interior, and everything is tucked away nicely. The use of an All-in-one CPU water cooler makes a dramatic impact on the amount of space within the case, despite it being the larger NZXT Kraken X61, which has a bigger radiator than the X41 used in the Hulk.

Once again we see MSI's Z97S SLI Krait Edition motherboard at work, and once again we're a little disappointed by the onboard audio solution. PLE will upgrade this if you choose a different option; we'd suggest going with the ASUS Xonar 51. for \$51.

The exact same CPU as used in the Hulk is found in this system, in the form of the Intel Core i5 4690K. Interestingly, neither PLE nor ScorpTec overclocks this for the user, a feature that used to be pretty common in the past. We're guessing it's likely due to warranty issues, not to mention the fact that the 4690K's overclocking potential can be so variable. Still, with an even better



cooler than the Hulk, the potential for overclocking the PLE system is even better.

Once again we see a GTX 970 providing the GPU prowess, but this time around it's Gigabyte's GTX 970 G1 Gaming model. Choosing between this and the Galax GTX 970 is a case of swings and roundabouts, as they're both equally good cards. PLE has also stuck with the bare minimum memory we'd recommend in a gaming PC, with an 8GB kit of Geil memory. However, it's capable of running at 2666MHz, a big speed increase over the memory found in the ScorpTec system.

On the other hand high speed storage is populated by a 250GB Samsung 850 EVO drive, which is a value version of the 850 PRO. Again we have to question whether 250GB is enough these days, with games like GTA5 taking up 40 or 50GB of storage space. We'd highly recommend going for the 480GB version

instead. Long term storage is handled by a 2TB drive, but this time around it's a WD Green model.

As expected, performance is neck and neck with the Hulk, but we have to give the Hulk the edge due to its superior external appearance. Having said that, if you prefer a more subtle case appearance, and want to save \$150, the PLE is the one for you. *BENNETT RING* 

- Excellent build quality throughout
- Better cooler than Hulk
- Balanced specs
-
- Small SSD
- Not as pretty as the Hulk

VERDICT:

It's not quite as pretty as the Hulk, but it's also a little cheaper, and includes a surge-protected powerboard, which may tip this build in your favour.

8

Alienware Alpha

Small case, smaller performance

PRICE \$1299
www.alienware.com.au



The Alpha is one of the more remarkable pre-built gaming PCs that Aussies can buy. Designed by Alienware to deliver a full gaming PC experience in a form factor around half the size of a Playstation 4, it's easily the smallest gaming PC money can buy. To make it so small Alienware had to get the help of NVIDIA to create a custom GPU, but can such a small, affordable box really deliver the performance demanded by today's power-guzzling games? In a word, no.

We should highlight just how tiny the Alpha is, as that's its key selling point. At 55mm high, by 200mm wide and long, it's frickin' small. The large external powerpack is about the same size as an Xbox 360's though, so you'll need to tuck that away as well. Twin USB 2.0 ports adorn the front, while twin USB 3.0 can be found on the rear. A single HDMI 1.4a output is provided, along with HDMI in and one optical audio out.

The custom Alpha interface is the first thing you'll see when booting up this box, and it's basically a way to interact with Steam and a few basic settings using the included wireless Xbox controller. From here it's a cinch to launch Steam in big-picture mode, removing the need entirely for a mouse and keyboard. Thankfully it's possible to boot straight into Windows if you'd prefer.

Tucked away inside the tiny case is an impressive CPU, in the form of Intel's Core i7-4765T, whose quad-cores max out at a decent top speed of 3GHz. It's even got Hyperthreading. This is paired with 8GB of memory, while a whopping big 2TB hard drive takes care of storage. Obviously it's mechanical, and without any form of SSD we noticed extremely sluggish desktop performance. Even installing our benchmarks took forever; on other systems Mordor would restore from a backup in about 2 minutes, but it took over 30 minutes on this system. Sadly there's no option to upgrade this when ordering the Alpha, which puts it at an extreme disadvantage compared to a normal desktop PC, though it is possible to install one yourself if you don't mind getting your hands dirty.

Alienware doesn't disclose the type of GPU used within, as it's a custom critter, but it appears to be based on the GTX 860M... which is actually identical to a desktop GTX 750 Ti. That's right, it's using an entry-level GPU design from over a year ago, which is obviously going

to hurt performance when compared to the GTX 960s found in other budget systems of a similar price point.

As our benchmarks show, the Alpha simply doesn't have the performance to handle 1080p or 2560 x 1440 at Ultra detail. Backing detail back to low results in playable performance, but in that case you're better off playing the graphically superior PS4 version.

The Alpha is a great idea, but we wish Alienware had adopted a slightly larger chassis to accommodate a more powerful GPU and secondary SSD drive. As it stands, this is a novel concept but is far too expensive to act as a simple media and casual gaming box. **BENNETH RING PC**

- Absolutely tiny
- Whisper quiet
- Good CPU

-
- Woeful GPU
- No SSD
- Poor overall performance

VERDICT:

It might be tiny, but the sacrifice in performance makes this a poor gaming box.

6

Origin Genesis X99

Mind. Blown.

PRICE \$8790 FOR REVIEW SAMPLE, STARTS AT \$3622
www.originpc.com.au

Welcome to crazy town, population the Origin Genesis X99. Origin PC is known for building ridiculously high-end PCs, but this one takes the cake. There's a reason it costs close to nine grand, but if you've got the money to burn you'd be hard pressed to find anything more extreme than this machine. We've got one qualm with it though, but more about that in a bit.

The Genesis comes in a custom case, and it's an absolute ripper, built to last, with excellent styling. It's also absolutely massive, and ships in a giant wooden packing crate just to show you that you're getting your money's worth. Make sure you've got a strong friend nearby to help you move it, as it weighs more than is healthy for one person to lift.

At the heart of this system is Intel's octa-cored i7 5960X processor. This has a maximum speed of just 3.5GHz, but the inclusion of an Origin Cryogenic custom water cooling system means Origin has been able to pre-overclock it to a blazing 4.5GHz. It's hosted on the brilliant ASUS Rampage V Extreme motherboard, which was an absolute must considering the amount of graphics hardware installed within.

Not one, but TWO Radeon R9 295X2 graphics cards are installed. For those who are unaware, each of these cards has two R9 290 GPUs installed, making this a quad-CrossFire system. It's able to smash through 4K games with ease, but we are a little concerned about the use of these cards. To put it bluntly, the R9 295X2 has heat issues, and we've had several anecdotal reports of friend's cards dying. We're also a little unhappy with AMD's Radeon driver team, who release WHQL drivers about as often as EA releases free DLC for its games – rarely, if ever. Thankfully it's possible to select different GPUs if you so desire, with AMD's latest range about to hit Origin's online store. We can only imagine how four Fury X graphics cards will perform. Twin Kingston HyperX 240GB drives are installed in RAID 0 mode for the OS install, while a powerful 1500W power supply delivers the high levels of



electricity required by such an over the top build.

This machine is obviously intended for 4K or higher gaming, but we chose to stick with our standard settings so you could see how it compares to the other systems. Unfortunately at this low resolution the quad-GPU system doesn't have the chance to flex its muscles, with the CPU being the limiting factor. Expect performance to soar when running at 4K resolution though, where this machine will simply cream the competition. Only the 3DMark benchmark really showed how fast this thing is, running rings around the other systems.

There's one hitch with this build, and that's how rowdy it gets when the thing heats up. It's not too bad at first, but after running the Grid benchmark on looping mode, we noticed the two graphics cards started pumping out

a decent amount of fan noise. Again, this is an issue that could be solved if quieter, more thermally efficient cards were installed, such as NVIDIA's GTX 980 Ti.

There's no denying that this is a supremely expensive PC, but it's aimed at those who don't mind paying for the absolute best hardware on the market. It's also customisable enough to get around our quibbles with the GPU selection, and there's no denying that Origin knows what it takes to build a record-breaking system. *BENNETT RING PC*

- Beautiful build quality
- Insane specifications
- Quad GPUs!

- Gets noisy under load
- Very expensive
- R9 295X2 has questionable reliability

VERDICT:

Welcome to the fastest gaming PC money can buy.

9

Alienware Area 51

If only we could buy the case alone

PRICE \$4,585 FOR REVIEW CONFIG, STARTS AT \$2,999
www.alienware.com.au



If you're looking for something that inhabits the mid-ground between our \$2400 systems and the rich-man's Origin Genesis X99, the Area 51 from Alienware is surprisingly good value. Our sample was priced at around four and a half grand, which is about what we'd expect to pay for a high-end system packing dual GPUs and a premium CPU, and that's exactly what the Area 51 delivered.

We love Alienware's proprietary case, which uses a very unique triangular layout to make it look quite unlike every other PC on the market. Slick strip-lighting on the exterior makes it look like a prop out of Tron, and the colours can be customised to match your interior design. It's not just a good-looker though; the interior design provides excellent airflow for the components, and the hard drives are all isolated from the rest of the components. Combined with the wind-tunnel effect of the design, the clever design ensures that it runs extremely quietly. The triangular shape also makes it super easy to access the rear ports, as you don't need to move it away from the wall to do so.

Residing within our review sample was Intel's Core i7 5820K processor, a six cored beast that ramps up to 3.6GHz under load. It's cooled via an All-in-one water cooler, so hitting its maximum overclocking potential shouldn't be too hard. Note that this CPU is no longer available in the store, with the 5930K replacing it, which has been overclocked

by Alienware up to 3.9GHz. A nice touch is the inclusion of 802.11ac Wi-Fi, something the other systems all lack. Sure, it's not that expensive to install your own Wi-Fi card, but it's great to see Alienware has done all the thinking for you.

16GB of DDR4 2133MHz memory is included, as is a huge 4TB mechanical drive. The 256GB SSD seems a little small considering the price of this system, but this can be doubled to a 512GB version for another \$337. An 850W power supply handles the power requirements of the system, and this too can be upgraded, with a 1.5KW option if you feel you're going to install more graphics cards in the future.

Speaking of which, graphics duties are handled by twin GTX 970 graphics cards, which can easily be pushed up to speeds approaching that of a GTX 980 once you install some simple overclocking

software. At this price point we'd preferred to have seen true 980 cards though. Given the potent hardware within, our benchmark results aren't too surprising, with it easily topping the more affordable systems. However, given that our budget systems would probably match these numbers with the installation of another \$600 graphics card, we're left to wonder just how good value the Area 51 really is. There's no denying it's one sexy, innovative monster, but for four and half grand we expected slightly more for our money.

BENNETT RING PC

- Sexy case design
- Twin GPUs
- Near silent operation

-
- Overpriced considering specs
- Lacks SSD space

VERDICT:

It's a powerful and pretty machine, but we expected a little extra oomph at this price.

7

MOUSE/ KEYBOARD ROUNDUP

For the longest time, Corsair had the monopoly on mechanical keyboards, with the wonderful K70 and K95 being two of our favourite gaming keyboards ever. Now that their exclusivity with Cherry has expired, some new players have come into the market.

Cherry MX Board 6.0

Premium feel, and price

PRICE \$280
www.cherrycorp.com

When it comes to mechanical keyboard switches, German switch manufacturer Cherry sits high on the top of the mountain. All of their switches are in massive demand, so much so that for a while they couldn't keep up with orders. Considering the popularity of the switches in gaming keyboards and how much technology is crammed into each new product on the market, it's refreshing to see that the new Cherry MX Board 6.0 is a pretty bare bones affair. It's a keyboard that features all of the standard keys and little more. This is precisely what makes it such a joy to use. The keyboard is built around two things, the Cherry Red switch and Cherry's new "Realkey" technology. Those fond of the softer feel of the brown switches or the clickiness of the blues might be disappointed to discover that Cherry have no plans to release the board with anything other than red switches, but it's doubtful that either of those switches would improve the overall experience.

Marketed towards professionals who require a fast keyboard response, such as programmers, typists, writers and the like, the MX Board 6.0 still has a lot to offer gamers thanks to the Realkey technology. Most keyboards, even some that say they have zero latency or ghosting still have a small "debounce"

time – that's the time between the switch bouncing off the contact and registering a second key press. Realkey uses an analogue controller to minimise debounce time to a single millisecond, meaning that the only the Flash would be able to out type the keyboard. In gaming terms this means that every key press, even if done simultaneously will be registered, allowing for lightning fast control in any game but RTS especially, a genre that often demands multiple fast inputs for command. There are no macro keys or any standard gaming features, and any media controls are relegated to an F key.

The build quality of the MX Board 6.0 is outstanding, with an aluminium chassis and an enormous, comfortable wrist rest. It feels solid and heavy, like a prestige machine rather than something that just sits on your desk and gets pecked at. The keys are slightly sunk into the chassis giving them a little bit of protection and cutting down on any light bleed from the red LEDs under each

key. The caps lock and Windows lock key (disabling the Windows key, Alt-Tab and the like) light up blue, but aside from that there are no other colours available.

The only real bugbear with the MX Board 6.0 is the high price. It's selling for around \$219 USD. That's just of \$280 AUD at the current (June) exchange rates. No matter how you slice it that's a lot of money to pay for a fairly bare bones keyboard. If you're willing to pay for premium quality, there is really nothing better or more comfortable than the MX Board 6.0. It's a joy to use, beautifully built and great looking, but if you just want some fast response times in gaming, you should probably look elsewhere.*DANIEL WILKS PC*

- Amazing build quality
- Super-fast response

-
- Very pricy
- Bare bones

VERDICT:

One of the nicest keyboards we've ever seen comes with a hefty price tag

9



Steelseries Apex M800

Light up your life

PRICE \$279
www.steelseries.com



Rather than opting for one of the popular Cherry mechanical switches, Steelseries has instead forged its own path, designing their own mechanical switch called the QS1. The switch for the most part feels like a slightly softer Cherry red but has a few features that make it stand out from the better known brand as well as make it feel quite unique in its own right. The QS1 switches have a shorter actuation length than the Cherry switches – 3mm rather than 4mm – and while this doesn't sound like much, it makes for a very different feel, especially when combined with the low profile key caps of the M800.

When it comes to twitch gaming, the low profile keys, short actuation and 256 key anti-ghosting are a real boon, allowing for really fast input, but for other genres and general typing the short actuation isn't as useful. The sensitivity of the switches means that they can activate even at the slightest touch, making for some seriously patchy typing. The massive double sized spacebar is similarly a boon to gaming, but when it comes to more practical use becomes something of a hindrance as it's all too easy to brush your hand over it and insert a space where none is really needed, a problem exacerbated by the lack of a wrist rest. The giant spacebar is also a greasy fingerprint magnet. In

addition to the regular keys, the M800 sports five fully programmable macro keys and media controls tagged to the F keys. The keyboard also sports two full powered USB ports at the back – not a revolutionary feature by any stretch of the imagination, but more easily accessible USB ports are always welcome.

Unlike the Cherry switches that feature an LED situated near the edge of the switch, the LEDs in the QS1 switches are centred. In practical terms, what this means is that there is far less light bleed from the corners of the switch, so the programmable lighting effects are truly spectacular. Each of the switches can be programmed with the full RGB 16.8 million colours through the easy to use Steelseries Engine software. There are a number of preset animated lighting modes or colour schemes available in the engine but users can also create their own, tailoring the keyboard to their favourite games, shortcuts, hotkeys or whims. While the lighting is ultimately just window dressing, it's hard not to be impressed by the look of the Apex M800. It may be large, but it's also sleek and surprisingly low profile.

While there is a lot to like about the Steelseries Apex M800 – the proprietary switches feel great, the response is



great for twitch gaming, but ultimately there are equally good and feature packed keyboards available at a lower price point. It seems as though the real defining factor on the M800 is the programmable lighting, and whilst it is impressive it is ultimately a pretty pointless feature, that has added to the price but not to performance or usability.

DANIEL WILKS PC

- Amazing for twitch gaming
- Great lighting
- Nice feel
-
- Awkward spacebar
- Extremely sensitive keys

VERDICT:

Great to use but priced well beyond its peers

8

ASUS Strix Tactic Pro

Bowl of Cherries

PRICE \$152
www.asus.com/au

The ASUS Strix Tactic Pro is a huge keyboard. It's both wide and deep but all of the real estate is used. To the left of the keyboard are a double row of programmable macro keys, under the space bar are another three thumb activated macro buttons and the function keys also double as programmable macro buttons, making for a rather formidable 21 macro buttons in all. The Tactic Pro keyboard we reviewed featured Cherry brown switches, but unlike many other mechanical keyboard manufacturers using Cherry switches, ASUS offers the full range of switch colours, so the keyboard is available with red, brown, blue or black switches. With the brown switches and their slightly tougher actuation than the reds, the Tactic Pro keyboard feels nice and solid, bellying the fact that it's mostly made out of plastic. The keyboard is nice and comfortable for the most part, but the lack of a



wrist rest is a bit of a disappointment, especially considering that the strange shape of the keyboard all but precludes the use of a third party wrist rest.

The driver software is simple but useful enough for programming macros and setting up profiles – all of which can be stored in the 4mb of keyboard memory rather than the driver itself. For the price, the ASUS Strix Tactic Pro has a lot of nice features and feels quite good under hand, but the large form factor and lack of a wrist rest may definitely put some punters off. DANIEL WILKS PC

- Feels solid
 - Choice of Cherry keys
 - Good features
-
- Huge, awkward form factor

VERDICT:

A good gaming keyboard lost in a competitive price range.

7

Cougar 500k

Insane in the Membrane

PRICE \$89
www.couргaming.com

If you a right thumb spacebar user the Cougar 500k is rendered nearly useless for you right out of the box. Thanks to a split spacebar design, the right half of the spacebar is used as a macro button whereas the left is used for space. You can set the macro button to act as a space bar in the Cougar UIX driver, but having to go online, download and install the driver and then hotkey the G6 macro key to work as a spacebar seems like a pretty big hurdle to jump just to be able to type properly.

Although the raised keys make the Cougar 500k look like a mechanical keyboard, it's actually a hybrid membrane keyboard, with sprung keys pressing rubber nubs for actuation. Of all the membrane keyboards we've seen, the Cougar 500k is one of the nicest feeling. There is some nice resistance to the keys and the rubber nubs on the membrane have a nice clicky feel, making the keys feel a little like



Cherry blue keys. Through the mostly straightforward driver software users can program the six macro keys (one of which is the half spacebar) and set up profiles. Another interesting feature are the four repeat rate settings that can be switched using the FN key and functions 1-4. The repeat rate artificially increases the number of times a depressed key is polled for button mashing. It's cute but is more of a hindrance than help in most games. DANIEL WILKS PC

- Decent features
 - Nice key feel
 - Decent software
-
- Split space bar
 - Poor leg design
 - Feels a bit cheap

VERDICT:

A decent array of features but for the price but there are better keyboards for only slightly more.

7

Turtle Beach Grip 300 Gaming Mouse Kit

Gaming on a budget

PRICE \$69
www.turtlebeach.com

As the name suggests, the Turtle Beach Grip 300 gaming mouse kit is more than just a mouse. The budget priced kit also features a rather excellent mouse mat. As nice as the included mouse mat is, the mouse itself is the real star of the show. It's pretty bare bones, as you would expect for the price point, but the overall build quality and included features far outstrip the damage it will do to your wallet. The mouse is a little wide for some hands, but we found it very comfortable. As the name suggests, the entire surface is covered in a nice rubberised grip surface – not the best if you've got sweaty hands but otherwise very appealing. The left and right buttons are nice and fast, with a good feel to the click and the scroll wheel feels nice and solid with a nice graduated scroll and solid click. Two nice thumb buttons complete the

austere looking mouse. Rather than having digital switches for polling rate and DPI on the top of the mouse, the Grip 300 instead has two switches on the bottom of the mouse, situated below the sensor to set the levels. Polling can be switched between 125hz, 500hz and 1000hz and DPI can be switched between 500, 1000 and 1750.

The Grip 300 probably doesn't have enough in the way of features, resolution or modifiable aspects to appeal to truly hardcore gamers, but for the price, the Grip 300 is an amazing mouse. It's fast, accurate and feels great in the hand. *DANIEL WILKS PC*



- Cheap
 - Great build quality
 - Quality buttons
-
- Bare bones
 - Fairly low DPI

VERDICT:

It's definitely not professional grade but for the price there really is nothing better.

9

ASUS RoG Gladius

Customisation and accuracy

PRICE \$79
www.asus.com

Malky uses a RoG Gladius to lay out PC PowerPlay. That should be enough of a recommendation for most people, but if you need some more convincing as to the quality of this mouse, read on. While most gaming mice seem determined to impress by flashing up big numbers for polling and DPI, RoG seems to have taken a leaf out of the mechanical keyboard handbook when it came to designing the Gladius. The mouse still boasts up to 6400 DPI and a 2000hz polling rate, but the most interesting features of the mouse are literally under the surface.

The top of the mouse can be easily removed to give access to the left and right button switches, each of which can be easily removed and replaced, either with the same switch or any other in the range that fits the same profile. The mouse comes with two extra Omron switches in case you somehow run through the two million

clicks each of the switches are rated for and need some quick replacements. The extremely easy to use driver software also allows for a great deal of customisation, from sensitivity and polling through to turn angle snapping and mouse acceleration and deceleration.

While the mouse doesn't feature the range of macro programmable buttons that are found on many gaming mice, the Gladius is still an extremely solid gaming product. It's extremely comfortable in the hands, and the emphasis on accuracy and usability over speed makes it a great choice for people who aren't looking for professional grade gaming gear. *DANIEL WILKS PC*



- Extremely comfortable
 - Great customisation options
-
- More buttons would be nice

VERDICT:

An excellent gaming mouse that focusses on customisation and accuracy rather than speed.

9

ASUS RoG Sica

LoL at DOTA

PRICE \$50
www.asus.com

Designed with input from professional gaming team, Taiwan Assassins, the RoG Sica is a budget, ambidextrous mouse intended for fast clicky games like MOBAs. Its design is austere but appealing, with a simple narrow body separated from the left and right mouse buttons. The buttons are separate to the body to shorten the actuation length and increase the click response time. That's the theory anyway. We didn't really experience any increased click response, but then again, none of us are professional MOBA gamers. In keeping with the intended use of the mouse, the rubber side grips are placed quite far back, making it more suitable for the claw style fingertip grip favoured by a number of professional gamers. Even so, the ambidextrous design is quite comfortable no matter how you hold it. The 5000 DPI, 1000Hz polling rate make for an extremely fast and accurate mouse.

The build quality is excellent but part of the reason that it's so well made is that the mouse is incredibly bare bones – just two buttons and a scroll wheel, one excellent sensor and some driver software that allows you to tweak a few DPI settings or turn the lighting on or off. The RoG Sica is too bare bones for a number of genres that all but require the use of extra mouse buttons or on the fly DPI switching, but if you're into your MOBAs and want something that will give you a competitive edge without breaking the bank, the Sica could definitely be the mouse you've been waiting for. *DANIEL WILKS PC*



- Extremely cheap
- Fast and accurate
- Ambidextrous
-
- Bare bones

VERDICT:

If you're into MOBAs you'll want one

8

Roccat Apuri

The Mouse Scorpion

PRICE \$39
www.roccat.org

OK, you got us. The Roccat Apuri is neither a mouse nor a keyboard, but it definitely is deserving of space on your desktop. A combination powered four port USB hub and mouse bungee, the Apuri has quickly become a much coveted favourite desktop adornment in the PCPP bunker. Why? It's useful and also looks pretty damn neat.

The Apuri looks something like a three legged scorpion creature with some glowing blue highlights. For those not familiar with the term, a mouse bungee is a device that holds a mouse cord in an elevated position ensuring that the cord doesn't get snagged or tug. The soft rubber bungee on the Apuri is excellent and even proved useful with a wireless mouse, as we could drape the wireless dongle (on a USB extension cord) over the bungee, ensuring that it was always close to the mouse all but negating any chance of interference from other devices. The bungee is removable as



well, so the Apuri can be used as nothing more than a simple 4 port powered USB hub. It's a little disappointing that the current model only features USB 2.0 compatibility, but hopefully Roccat will release a USB 3.0 or 3.1 version of the device sometime in the near future. We'd definitely be keen to get our hands on one of them, after fighting amongst ourselves over the review sample of course. *DANIEL WILKS PC*

- Great bungee
- 4 powered USB ports
- Looks great
-
- Only USB 2.0

VERDICT:

The Apuri isn't destined to leave out desktops anytime soon.

9



HYPER >>

GAMES OF
THE FUTURE
SPECIAL

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MOAR MEGAHERTZ!

Overclocking can take as little as ten minutes, while boosting the performance of your PC by up to 30%. **BENNETT RING** shows you how to extract the most out of your CPU and GPU.

Once the secretive domain of ultra-nerds, overclocking has since become truly mainstream. Thanks to ever helpful motherboard manufacturers endowing their products with easy to find overclocking options, not to mention a million and one YouTube overclocking tutorials, what used to take weeks of research and days of tweaking can now be accomplished in mere minutes. Unfortunately the returns aren't quite as great as they used to be; even Intel's latest Broadwell CPUs seem to be limited to a mere 25% overclock, whereas CPUs of years gone by were able to hit overclocked frequencies 50% higher than stock. Still, a 25% boost in performance isn't anything to be sneezed at, especially when all it'll cost you is the \$90 or so required for a high performance cooler. Compared to the two or three hundred bucks it'll cost you to buy a chip with a similar speed increase, and CPU overclocking is a no-brainer. GPU overclocking is even easier – rather than have to mess with a few dozen settings, it's simply a matter of adjusting a couple of sliders until your graphics start looking like you've taken some bad acid. We're going to show you how to wring every last drop of performance out of your CPU and GPU. Note that we're only covering Intel CPUs, as they cover around 80% of the gaming market according to the Steam Hardware Survey, and we don't have the space to cover both. However, we'll be covering both AMD and NVIDIA GPUs, because overclocking them is so similar, not to mention simple.

ABANDON WARRANTIES, ALL YE WHO ENTER HERE

While the risk of frying your hardware is extremely low when overclocking – especially if you don't mess with voltages too much – it is still a concern. Unfortunately you'll void your warranty when overclocking the CPU, though there is no way for the supplier to know that this is how you killed it if you choose not to tell them, and don't take the CPU into the store still mounted in your system. We're not advocating lying to your retailer, as these guys do it tough at the best of times due to the tiny margins on today's PC hardware, but we'll let you do what you want with that information. On the other hand, GPU warranties vary based on the manufacturer – some will allow overclocking, while others will not. Once again it's impossible for the supplier

to know that you killed the card via overclocking, unless you bring your full PC to them and they can see the overclocking software at work.

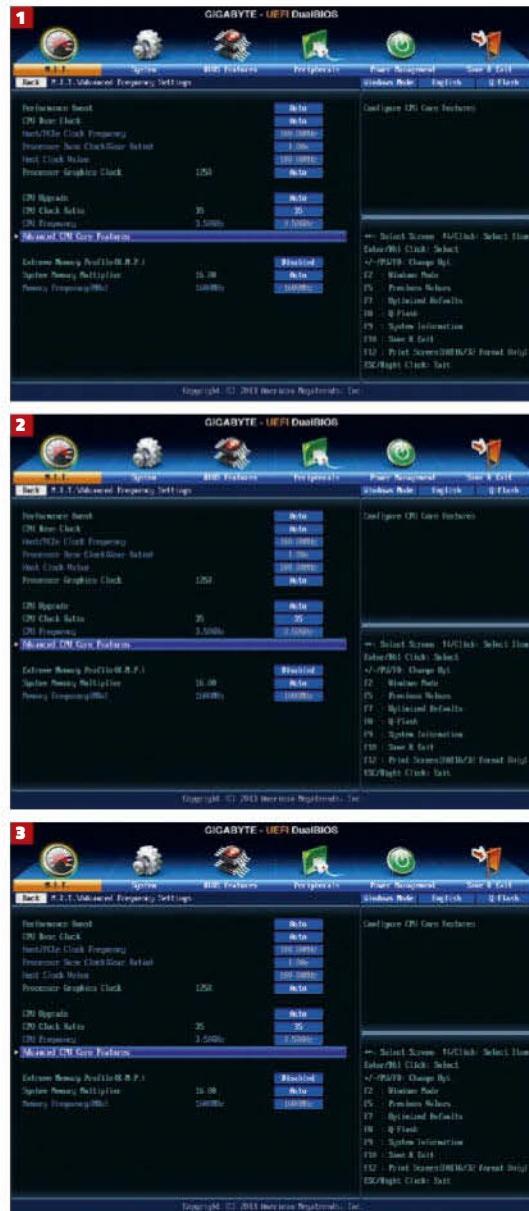
Rather than lie to your supplier, we highly recommend sticking with conservative voltages when overclocking. A 10% increase to your CPU voltage is well within the safe range, but you take matters into your own hands with anything higher, and many motherboards support insanely high voltages that will instantly fry your CPU if you select one. GPU voltages tend to be limited by the hardware though, but it's worth keeping the 10% limit in mind.

A much more pressing concern is data loss. When a CPU is pushed too far, it's possible to corrupt your Windows install, which is always a pain in the rear end. As a result, we recommend backing everything up before you start tweaking; this way if you have to reinstall Windows after an unsuccessful overclock you won't have lost anything important.

CPU Overclocking

We overclocked an Intel i7-4770K mounted in Gigabyte's excellent Z87-UD3H, as we've found it to be a very capable overclocker; newer Z97 boards should be just as overclockable, and use an identical procedure. Note that certain settings may appear to have slightly different naming depending on which manufacturer you go with – a quick Google search will reveal the correct term for your motherboard.

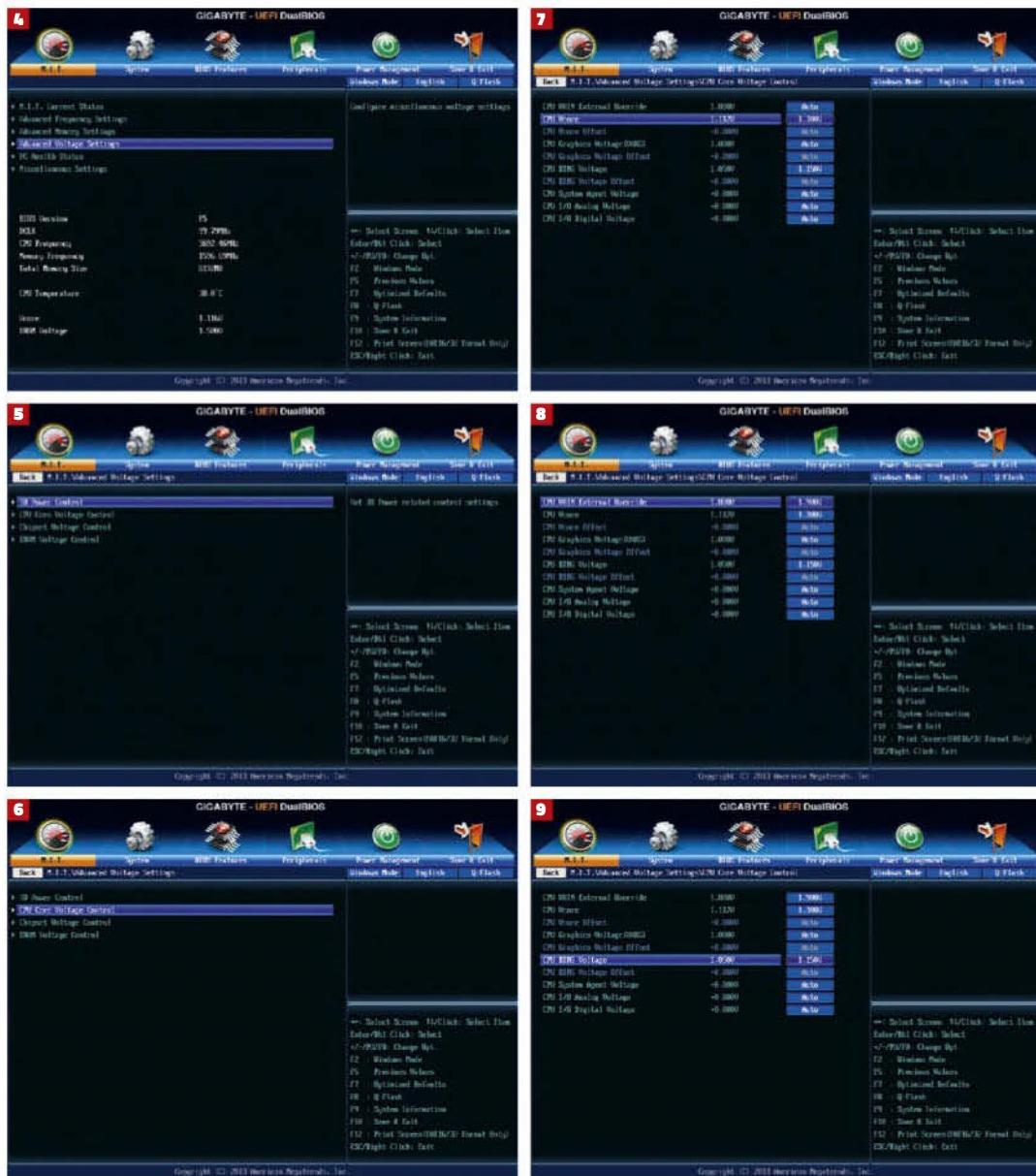
Due to the higher temperatures caused by overclocking, we HIGHLY recommend installing a performance cooler on your CPU, as the stock Intel cooler won't have the guts to remove the extra heat. Also, the chillier your CPU, the higher you'll be able to overclock it, which is why watercooling is favoured by extreme overclockers. For a good air-cooled solution we recommend Noctua's impeccable NH-D15 air cooler. At \$115 it's not cheap, but it's extremely quiet while also being an excellent cooler. Finally, only K-series CPUs from Intel can be overclocked using the following method; if your CPU doesn't end with a K, it's not going to overclock worth a damn.



>Step 1

POWER SAVING BE DAMNED

When using default settings, Intel CPUs have several power saving technologies enabled, but these can play havoc with an overclocked CPU; things such as automatically lowering the voltage when it's idling to save power can turn a solid overclock into an unstable mess. So the first step is to disable all of these. Head into the motherboard's BIOS (hit delete while the system is booting up) and look for a heading called "Advanced CPU Core Features". Select this and you'll see a range of settings that need to be disabled – these are "CPU Enhanced Halt (C1E)", "C3 State Support", "C6/7 State Support", "CPU Thermal Monitor", and "CPU EIST Function". We're also going to disable the CPU's internal graphics, to help keep the CPU as cool as possible while overclocked. Go to the "Peripherals" section in the BIOS, and set "Internal Graphics" to disabled. F10 to save, reboot, and head back into the BIOS once more.



>Step 2

INCREASE THE VOLTAGE

It's time to supply the CPU with just a little more power, which is usually required to get the chip to run stably at a higher speed. We urge you to approach this step with caution – adding too much voltage is a sure fire way to turn your expensive CPU into a broken piece of silicon. The voltage of your CPU will vary depending on the model – our 4770K has a default voltage of 1.112V. We'd recommend going no higher than 10% over the stock speed, but we found 1.3V to be just right for our chip. To find the CPU voltage, head into "Advanced Voltage Settings", then "3D Power Control" then "CPU Core Voltage Control". The setting we're looking for is

called CPU vcore, which we increased to 1.3V – again, just to reiterate, we'd suggest going no higher than 10% over your stock core voltage. While we're at it, we're going to increase a couple of other voltages which are shown to increase stability while overclocked. First, change the "CPU VRIN External Overide" to 1.9V, as well as the "CPU Ring Voltage" to 1.15V. Hit F10 to save again, and boot back into the BIOS. Check your CPU temp, which will usually be under the "System Health" menu. Make sure it's not over 70C – if it is, drop your CPU vcore slightly.

Clear CMOS

Sometimes your motherboard can get stuck on settings that won't allow the PC to boot, which means you can't even get into the BIOS to lower it back to a stable settings. If this happens, first try rebooting the motherboard three times; newer boards will detect if it hasn't booted properly after three attempts, and will then reset everything back to default. If your motherboard doesn't have this feature, you'll need to manually clear the motherboard's CMOS. This is usually a jumper on older boards, while overclocking-focused boards will have a clear CMOS button that does the same thing. Simply turn the PC off at the PSU, then clear the CMOS, and reboot – you'll find the motherboard has now reset every single setting back to default.



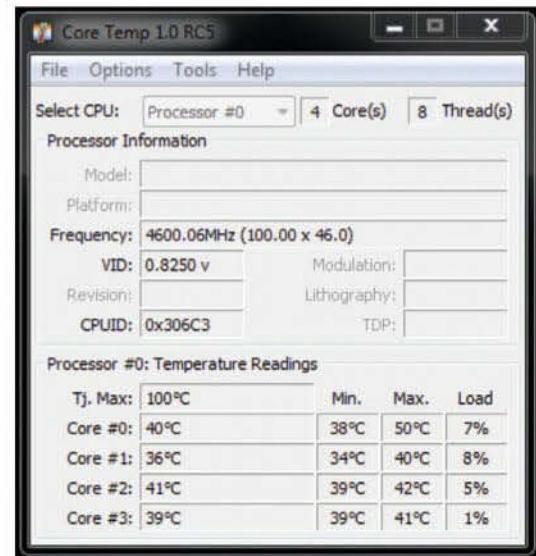
>Step 3

UNLEASH THE MEGAHERTZ!

Now that the CPU is running with more juice, it's time to increase the frequency. We do this by increasing the CPU's multiplier, which determines the speed of the CPU (CPU frequency equals the multiplier times the BCLK speed, which is 100MHz on Intel CPUs). Head into the BIOS and then back into the "Advanced CPU Core Features" menu. The first thing we want to do is disable Intel's Turbo Boost Technology, as we're going to set the CPU to run at full speed, all of the time. Change the "Intel R Turbo Boost Technology" setting to disabled. Now we need to change the multiplier value, which on our board is called the "CPU Clock Ratio". The default for our 3.5GHz chip is 35, so increase this in increments of two, before hitting F10 to save and booting into Windows. Keep doing this until your PC won't boot into Windows, then revert to the last CPU Clock Ratio that allowed you to boot into Windows. By doing this, we found the maximum bootable multiplier for our chip was 46, giving us a CPU frequency of 4.6GHz.

Windows vs BIOS

All of today's motherboards now include Windows-based software that allows you to tweak the CPU settings from a pretty graphics-based interface, rather than having to head into the BIOS. While we love the approachability of these programs, we've found that doing everything directly in the BIOS is still preferable, as the Windows software can often crash mid-overclock. Feel free to try your motherboard's overclocking software though, as it is improving all the time.

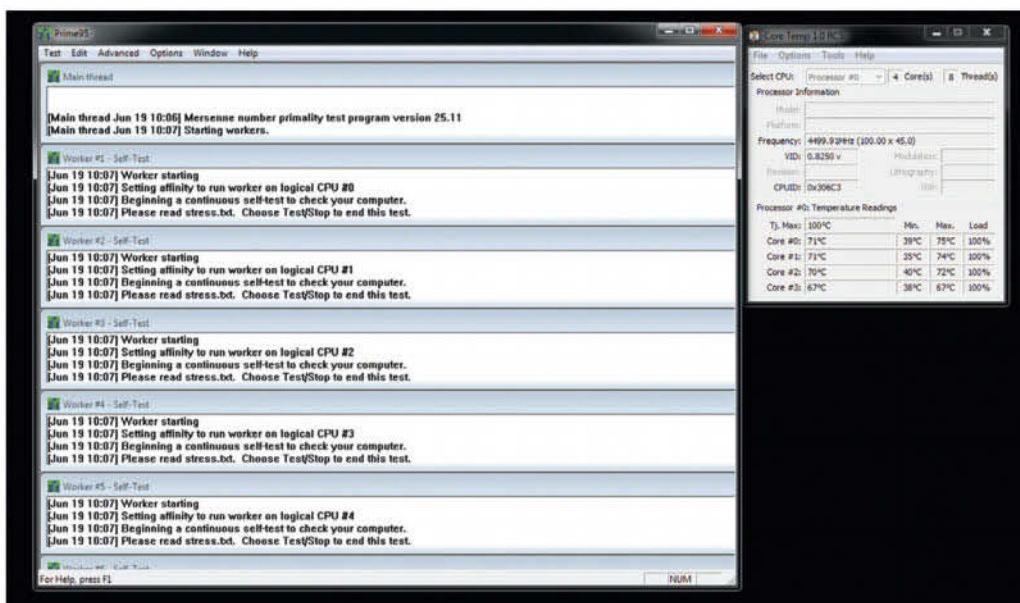


>Step 4

STABILITY TESTING

Now comes the part that takes time – checking the stability of your newly overclocked CPU. Just because it boots into Windows doesn't mean it can handle sweating out the latest games for several hours, so we need to stress-test the CPU. We use a free piece of software called Prime95 for this, which you can easily find online. This runs extremely taxing mathematics calculations on the CPU, pushing it to the limit. We suggest running this in the Torture Test blend mode, while also running the temperature monitoring software that comes with your motherboard. This will allow you to see if any instability is related to heat issues – if your CPU hits 70C or higher and then crashes, it's running too hot, in which case you'll need to drop the voltage and possibly multiplier. Keep Prime95 running in the torture test mode for several hours – if it can keep running this for at least four hours without a crash, you should be

good to go. However, if it starts crashing, head back into the BIOS and drop the CPU Core Ratio by one, then restart the torture test. By doing this, we managed to find the maximum stable frequency of our 4770K, at 4.5GHz, which was 100MHz slower than the maximum bootable speed of 4.6GHz. This is a healthy 15% increase in performance, which isn't too shabby at all. We've heard reports that Intel's newest Broadwell chips are hitting 5GHz on air cooling, which is even more impressive.



Graphics Card Overclocking

Feeling a little overwhelmed by our CPU overclocking guide? Fear not, as pushing your graphics card's balls to the wall is a far simpler process. Not only is it easier, but the returns can be far greater, with GPU overclocks in the region of 30% being quite common. There's also no need to install a custom cooler, as they tend to hit these high speeds with the reference coolers in place. Bear in mind that a graphics card designed for overclocking will tend to have a much better cooler than one of the el cheapo varieties, which is why they cost more, and will likely hit a higher top speed.

Unlike Intel CPUs, which only support overclocking on K-variants, all graphics cards can be overclocked. There are two areas which can be tweaked – the GPU and the memory. AMD and NVIDIA both use different pieces of software for overclocking, but the methodology is very similar.



>Step 1

GPU TWEAKING

While most NVIDIA-based graphics cards now include their own piece of overclocking software, we recommend the excellent EVGA PrecisionX 16, which you can download for free from www.evga.com/precision/. We ran this on a GeForce GTX Titan Black, and the first thing you need to do is increase the Power Target to the maximum value, in this case 106%. Then we increased the GPU Clock Offset by 50MHz, and hit the apply button. This increases your GPU's core speed by 50MHz, although it's not 100% accurate due to NVIDIA's Boost technology also automatically adjusting the GPU's speed. Increasing the GPU will help with shader-intensive tasks.

AMD users can adjust their GPU speed right from the Catalyst drivers. Right click on your desktop and select Catalyst Control Center. Now click

on the "AMD OverDrive" Tab in the Performance area, and check the box called "Enable Graphics OverDrive". Hit Apply, and then adjust the "Power Limit Settings" to its maximum value of 20%. Then change "GPU clock Settings" slider so that it's 50MHz higher than your GPU's default speed. Our test machine was using an older Radeon HD 7970, which has a default speed of 1050MHz, so we increased it to 1100MHz.



>Step 2

STABILITY TESTING

Just like with your CPU, we need to test the GPU can handle its new frequency. To do this we use the free Heaven benchmark, which we run at maximum detail in looping mode. Watch the benchmark as it runs – if you see any weird glitches you'll know that your GPU is running too fast, and you'll need to back it down a notch. If the benchmark runs for 20 minutes or so without any glitches, head back into the AMD or Precision software and increase your GPU frequency by another 50MHz, then test again. Keep doing this until the benchmark either crashes or starts showing visual anomalies, then back the GPU frequency down to the last good setting. You've now found your GPU's maximum speed.

>Step 3

MEMORY MASTERS

You can also increase the speed of your graphics card's memory, which will help it to run at higher resolutions or with higher anti-aliasing. NVIDIA users should fire up EVGA PrecisionX 16, and increase the "Mem Clock Offset" slider by 50MHz, while Radeon users can head back into the AMD Overdrive tab and increase the "High Performance memory clock settings" by the same amount. Hit apply, and then head back into the Heaven benchmark. Perform stability testing once again, and if it passes with flying colours, increase the memory frequency by another 50MHz. Continue doing this until you find your graphics card's memory ceiling. Combine these two methods and you'll find the limit of your graphics card. It's also possible to increase the voltage on NVIDIA cards via the voltage slider, which can help squeeze out better GPU overclocks.



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